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SEEDS OF NATIVE AND NATURALIZED VETCHES OF NORTH AMERICA

Agriculture Handbook No. 392

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UNITED STATES DEPARTMENT OF AGRICULTURE

SEEDS OF NATIVE AND NATURALIZED VETCHES OF NORTH AMERICA

By Charles R. Gunn

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SEEDS OF NATIVE AND NATURALIZED VETCHES OF NORTH AMERICA

BY CHARLES R. GUNN, *plant taxonomist, Plant Science Research Division, Agricultural Research Service*

This study constitutes an investigation of external seed characteristics of 36 species of *Vicia* (Leguminosae) found in North America. With the increasing use of exotic and native vetches, the need for accurate identification of vetch seeds has become more apparent.

Except for Gunn 1970a,¹ identification of vetches by seed characteristics has been restricted to a few crop or weedy species (Brouwer and Stahlin 1955, Iannelli 1964, Justice 1952,

Korsmo 1935, Kostrakiewicz 1951, Musil 1963, Pierpoint 1949, Quartley 1968a and 1968b, Swederski 1924, Tupikova 1926, Utkin 1965, Vodák 1956, Wittmack 1922, and Zertová 1962). In several taxonomic treatments vetch seed characters are mentioned but not utilized to their fullest extent either in the construction of the keys or in the species descriptions (Ascherson and Graebner 1909, Ball 1968, Fedtschenko 1948, Gams 1924, Guinea 1953, and Hermann 1960).

MATERIAL AND METHODS

At least two seed samples of each of the 36 *Vicia* species described here are supported by voucher herbarium specimens. These authenticated seed samples have been used in preparing the photographs and in constructing the key. Additional seed samples, many identified by comparison, were used to complete the survey for each species.

Seed shapes are categorized as spherical, subspherical, oblong, oval, lenticular, sublenticular, pyramidal, subpyramidal, cuboidal, and subcuboidal. Occasionally seeds may be compressed-spherical or oblong with one or both ends truncated. This is usually caused by the pressure of adjacent seeds in the legume (pod). Ordinarily each seed has sufficient room to mature without pressure from adjacent seeds, because some ovules were not fertilized or have aborted. When all or nearly all the ovules mature, the seeds may be compressed from one or both sides. *Vicia lathyroides* is an exception, because usually its cuboidal seeds show the results of pressure from adjacent seeds and the

legume. For a more complete discussion, see Gunn 1970a.

The surface of the seedcoat is usually smooth. Species of *Vicia* that occasionally have a velvetlike seedcoat include *V. angustifolia*, *V. benghalensis*, *V. lutea*, *V. narbonensis*, *V. sativa*, and *V. villosa*. The seedcoat surface of *V. lathyroides* is pusticulate² and that of *V. hybrida* may be smooth or moderately rugose.

Seed and hilum colors were determined by Regina O. Hughes, botanical illustrator, using a stereoscopic microscope and a Nicholas illuminator. She classified the colors as whitish, straw, yellowish, orange red, rosy, reddish, ocher, green, greenish, brown, chocolate, gray, purplish, blackish, and combinations of these colors.

Vetch seeds are monochromed or marked. They may be marked by points (point-shaped dots), mottles (larger blotches or irregular shapes), and streaks (lines of color).

The dimensions of the seeds are length (par-

¹ The year in italic after the author's name is the key to the reference in Literature Cited, p. 42.

² MURLEY, M. R. SEEDS OF THE CRUCIFERAE OF NORTHEASTERN NORTH AMERICA. Amer. Midland Nat. 46: 69. 1951.

allel to hilum), width (from center of hilum to opposite side of seed and at right angle to plane of hilum), and thickness (at right angle to hilum and in same plane). The measurements were made with a stereoscopic microscope fitted with an ocular micrometer or a Lufkin pocket slide caliper.

Seeds are classified by length as small (less than 3 mm.), medium (3 mm. to less than 6 mm.), or large (6 mm. or more). The measurements used in the key and synopses are average values.

The hila of most members of the Lotoideae have a fine central groove, which is easily seen in all the vetches studied except those in which the funiculus persists. The lips of the groove may be the same color as the hilum or strikingly different. In the latter case, the whitish lips may be rather prominent, as seen in the photographs of *V. angustifolia*, *V. dasycarpa*, and *V. monantha*. Occasionally the hilar groove may be white within rather than the color of the hilum. An example of a white hilar groove may be seen in the photograph of *V. narbonensis* seed.

Some species have a halo, a discolored area, around the hilum, viz, *V. articulata* and *V. dasycarpa*.

The five hilum shapes are circumlinear, linear, oblong, wedge shaped, and oval or elliptical. A circumlinear hilum is more than 10 times longer than wide, occupies 50 percent or more of the seed circumference, and is always linear in shape. A linear hilum is five to seven (rarely nine to 10) times as long as wide, occupies less than 40 percent of the seed circumference, and has parallel margins. An oblong hilum is less than five times but always greater than twice as long as wide, has slightly curved margins, and occupies less than 40 percent of the seed circumference. A wedge-shaped hilum has margins converging to the lens. In all other respects it is similar to the oblong hilum. An oval or elliptical hilum is never longer than twice its width, is rounded in outline, and occupies less than 20 percent of the seed circumference.

The lens, as defined by Kopooshian,³ is "all

reinforcements of normal tissue of the seed, situated between the hilum and chalaza, on the trajectory of the principal vascular bundles. Externally it is a lens-shaped raised structure near the hilum." The term "chalaza" is often incorrectly used for this lens area. According to Pitot (1936), the chalaza may be close to the lens but is never found under it. He and other authors defined the chalaza as a "point at which the vascular bundles reach the nucellus."

The lens is located near the narrow end of the hilum, the end opposite the micropyle, except when the lens is on the opposite side of the seed, i.e., *V. hybrida*, *V. lutea*, and *V. pannonica*. The relative positions of the lens to the hilum are lens on the opposite side of the seed from the center of the hilum, center of lens removed (more than 0.5 mm.) from the hilum, center of lens near the hilum (less than 0.5 mm.) but the discolored area not touching the hilum, and lens confluent with the hilum (discolored area touching the hilum).

Descriptions and photographs of the legumes (pods) are included, because legume fragments or whole legumes may be available during seed identification. These legume characteristics were recorded: Color, outer surface of valves, length and width, shape in cross section, length of stipe, number of ovules, inner surface of valves, and degree of twist at dehiscence.

The color of the legumes may be altered by *Alternaria tenuis* auct. *sensu* Wiltshire, whose black mycelia darken the legumes. Legumes with this mold appear blackish and scurfy. Its presence may be determined by observing the catenulate (chainlike) spores with a compound microscope.

The outer surface of the valves may possess several topographical features, viz, hairs, nectariferous glands, a reticulate surface caused by visible venation, light-colored flush punctations especially prominent on mature (dark) valves, pustules, knoblike processes, and depressions between each seed.

The length of the legume was determined from the tip of the indurate part of the style to the base of the calyx. The width was measured at the widest part of the legume.

Legumes vary from terete to rather flattened in cross section. Most of them have an oblong or

³ KOPOOSHIAN, H. A. SEED CHARACTER RELATIONSHIPS IN THE LEGUMINOSAE. Microfilm 63-7257. Univ. Microfilms, Inc., Ann Arbor, Mich. 1963. [Unpublished.]

modified oblong shape. The apex and base are usually obliquely short or long acuminate, or the apex may be nearly beaked.

The length of the stipe was measured from the base of the calyx to the base of the valve. In most species the stipe is enclosed within the indurate calyx.

The inner surface of the valves is smooth for all native North American species. A few introduced species have a prominent or ill-defined cross-rib between each seed. These ribs are mounds of fibrous material, apparently derived from the fibers lining the inner surface of the valves.

Most of the valves twist tightly during dehiscence. In a tight twist the inner surface of the valve is not visible after twisting is completed. Occasionally legumes exhibit a loose twist when the inner surface of the valve is visible after twisting is completed.

The calyx and androecial sheath are usually attached to the mature legume. Petals are

rarely present. The androecial sheath is always on the lower side of the legume and is subtended by the single calyx tooth.

The greenhouse-grown plants were raised at the Soil Conservation Service greenhouses, Beltsville, Md.

In each photograph the magnification is indicated by a millimeter ruler. The space between each line represents 1 mm. In the legends the numbers after the collector's name refer to the voucher herbarium specimens.

The herbarium symbols are as follows: (ARIZ) – University of Arizona Herbarium, Tucson; (ISC) – Iowa State University Herbarium, Ames; (MICH) – University Herbarium, University of Michigan, Ann Arbor; (NA) – U.S. National Arboretum Herbarium, Washington, D.C.; (NY) – New York Botanical Garden, New York; (OKL) – Bebb Herbarium, University of Oklahoma, Norman; and (US) – U.S. National Herbarium, Smithsonian Institution, Washington, D.C.

SEED KEY TO VICIA SPECIES

1. Hilum circumlinear, occupying about 75 percent of seed circumference.
2. Seed lenticular; remnants of funiculus along each side of hilum as minute, white, parallel fringes *V. grandiflora* var. *kitaibeliana*
2. Seed spherical or subspherical; hilum without funicular fringes.
3. Seed over 5.5 mm. in length *V. gigantea*¹
3. Seed never more than 4 mm. in length.
4. Hilum conspicuous without magnification, lighter color than seedcoat.
5. Lens a conspicuous raised area about 0.4 mm. from hilum *V. minutiflora*²
5. Lens inconspicuous or not visible (raised center absent) and confluent with hilum *V. acutifolia*
4. Hilum color of seedcoat, thus difficult to locate without magnification. (Hilar groove lips may be conspicuous in *V. caroliniana*.)
6. Seed base color obscured by dense black mottling, thus seed appearing as monochrome blackish brown *V. caroliniana* and *V. hugeri*
6. Seed base color ochre to reddish brown, never concealed by mottles; mottles may be absent.
7. Seed about 2.2 mm. in length *V. floridana*
7. Seed 2.8 mm. or more in length.
8. Seed about 3.5 mm. in length; hilum usually surrounded by halo *V. sepium*
8. Seed about 2.8 mm. in length; halo absent *V. ocalensis*
1. Hilum various, occupying less than 40 percent of seed circumference.
9. Lens on opposite side of seed from center of hilum.
10. Hilum 3 mm. or more in length, occupying at least 18 percent of seed circumference *V. lutea*
10. Hilum seldom over 2 mm. in length, occupying 16 percent or less of seed circumference.
11. Seed spherical, 4–5 mm. thick; hilum 1.25 mm. wide *V. hybrida*
11. Seed sublenticular to subpyramidal, seldom exceeding 3.5 mm. in thickness; hilum 0.75 mm. or less in width *V. pannonica*
9. Lens near hilum, never more than one-half distance between center of hilum and opposite side of seed.
12. Seed definitely cuboidal or pyramidal.
13. Seedcoat smooth; seed pyramidal *V. ervilia*
13. Seedcoat pustulate; seed cuboidal *V. lathyroides*
12. Seed spherical, oblong, lenticular, or compressed-rounded.
14. Hilum elliptical to oval, 1½ to 2½ times longer than wide *V. narbonensis*
14. Hilum slightly wedge shaped to oblong, at least three times longer than wide.
15. Hilum basal; seed large, over 6 mm. in length AND width *V. faba*
15. Hilum lateral, parallel to seed length; seed smaller, less than 6 mm. in length AND width.
16. Funiculus permanently and completely attached to hilum, appearing as a raised, snow-white hilum *V. benghalensis*
16. Funiculus usually absent (except for minute traces); if attached, only loosely so and easily sloughed off, or attached over only part of hilum, seldom snow white.
17. Seed less than 2 mm. in length.
18. Hilum three times longer than wide, never occupying more than 25 percent of seed circumference *V. tetrasperma*
18. Hilum five times longer than wide, occupying 30 percent of seed circumference.
19. Lens center 1 mm. from end of hilum *V. leucophaea*
19. Lens center 0.5 to 0.7 mm. from end of hilum *V. humilis*
17. Seed at least 2 mm. in length.
20. Seedcoat glossy; seed less than 3 mm. in length; hilum usually covered by straw- to chocolate-colored funiculus *V. hirsuta*
20. Seedcoat not glossy (if semiglossy, seed over 3 mm. in length); funiculus absent (on immature seed if funiculus present, then not as above).
21. Hilum occupying less than 20 percent of seed circumference.
22. Lens noticeably reddish to orange red or yellowish.
23. Seed lenticular to sublenticular; over 5 mm. in length *V. articulata*
23. Seed subspherical to sublenticular, seldom over 4.5 mm. in length *V. disperma*

¹ *Vicia menziesii* Sprengel, an extinct endemic of Hawaii, keys out with *V. gigantea*. *Vicia menziesii* is discussed in Gunn (1970b).

² *Vicia reverchonii* S. Watson, an extinct endemic in environs of Dallas, Tex., and Wewoka, Okla., keys out with *V. minutiflora*. The taxonomic status of *V. reverchonii* is under investigation.

22. Lens not tinged with red except in seeds with reddish cast, then not noticeably redder than seedcoat.
24. Hilum occupying 15 percent of seed circumference.
25. Seed with black line (composed of mottles) occupying two-thirds of seed circumference *V. monantha*
25. Seed without this distinct black line.
26. Seed less than 3.5 mm. in length.
27. Hilum six times longer than wide *V. exigua*
27. Hilum five times or less longer than wide *V. angustifolia*
26. Seed 3.5 mm. or more in length.
28. Hilum flush with seedcoat; lips of hilar groove neither well developed nor strongly whitened *V. villosa*
28. Hilum appearing depressed at margin; lips of hilar groove well developed and usually strongly colored from straw to nearly white.
29. Lips of hilar groove usually strongly whitened; lens with raised center; seed usually rounded-rectangular (pillow shaped); seedcoat usually semi-glossy, variously colored, monochromed to densely mottled. (Largest seeds of *V. angustifolia* will key out here.) *V. sativa*
29. Lips of hilar groove only light colored; lens without raised center; seed oval, sublenticular, or oblong; seedcoat dull, consistently dull reddish to grayish brown, mottled with darker brown *V. dasycarpa*
24. Hilum occupying more than 15 percent (but less than 20 percent) of seed circumference.
30. Lips of hilar groove well developed, usually strongly whitened; OR seedcoat with greenish cast or covered with black velvet *V. angustifolia*
30. Lips neither strongly developed nor whitened; seedcoat neither greenish nor covered with black velvet.
31. Raised center of lens more than 1 mm. from hilum *V. americana*
31. Raised center of lens 1 mm. or less from hilum.
32. Hilum oblong; seed usually oblong *V. tenuifolia*
32. Hilum slightly wedge shaped; seed usually spherical.
33. Hilum six times longer than wide *V. exigua*
33. Hilum three to four times longer than wide *V. leavenworthii*
21. Hilum occupying 20 percent or more of seed circumference.
34. Lips of hilar groove well developed, usually strongly whitened; OR seedcoat with greenish cast or covered with black velvet *V. angustifolia*
34. Lips neither strongly developed nor whitened; seedcoat neither greenish nor covered with black velvet.
35. Raised center (or center) of lens 1 mm. or more from hilum.
36. Seed less than 3 mm. in length *V. leucophaea*
36. Seed 3 mm. or more in length.
37. Lens only slightly discolored, thus nearly invisible *V. cracca*
37. Lens with raised center and discolored, thus rather visible.
38. Seed dull purplish brown to dull light brown, scattered to densely mottled and pointed with darker brown *V. americana*
38. Seed dull, dark ocher, densely mottled and pointed with blackish brown *V. unijuga*
35. Raised center (or center) of lens less than 1 mm. from hilum.
39. Seed 3 mm. or more in length, usually oblong.
40. Hilum occupying about 30 percent of seed circumference *V. cracca*
40. Hilum occupying about 25 percent or less of seed circumference *V. tenuifolia*
39. Seed less than 3 mm. in length, usually spherical or nearly so.
41. Hilum four times or less longer than wide.
42. Hilum occupying about 20 percent of seed circumference *V. leavenworthii*
42. Hilum occupying about 30 percent of seed circumference *V. humilis*
41. Hilum five to six times longer than wide, occupying from 23 to 30 percent of seed circumference.
43. Seed about 2 mm. in length; lens center about 0.5 mm. from hilum *V. ludoviciana*
43. Seed about 2.5 mm. in length; lens center about 0.7 mm. from hilum.
44. Seed monochrome dull, dark brown *V. leucophaea*
44. Seed dull, reddish brown, mottled with black *V. pulchella*

SYNOPSIS OF SEED AND LEGUME CHARACTERS

Vicia acutifolia Ell.Sand Vetch
(Fig. 1)

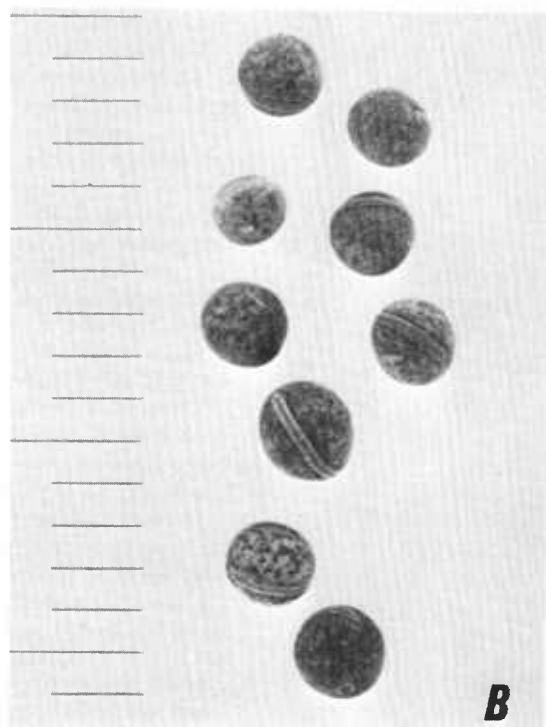
Seed subspherical to spherical; smooth; bright reddish brown, with blackish mottles; small; $2 \times 1.8 \times 2$ mm. Although most seeds average about 1.6 mm. in all dimensions, a few seeds in each sample and one entire collection from Glynn Co., Ga., averaged 2.5 mm. in length and thickness and 2 mm. in width.

Hilum lighter than seedcoat; lips of hilar groove color of hilum; funicular remnants adhering to margin; usually encompassed by faint light-brown halo; circumlinear; over 10 times longer than wide; occupying 75 percent of seed circumference.

Lens blackish blending with seedcoat; confluent with hilum.

Legume pale brown with greenish cast to darker brown; pubescent, becoming glabrate or glabrous with age; strongly punctate and reticulate; 24×5 mm.; flattened; linear-oblong; oblique and acute at both ends; stipe 3 mm. long; six to nine ovules; inner valve surface smooth; twisting tightly during dehiscence.

Notes.—Native of Florida and coastal southern Georgia. Grows in sandy soil, low calcareous hammocks, swamps, ditches, and roadsides. Closely related to *V. floridana* and *V. ocalensis*. Six samples studied.



BN-37070, BN-37069
FIGURE 1.—*Vicia acutifolia* Ell.: A, Legumes and seeds; B, seeds. C. R. Gunn 3333, Levy Co., Fla. (NA, US).

Vicia americana Willd.American Vetch
(Fig. 2)

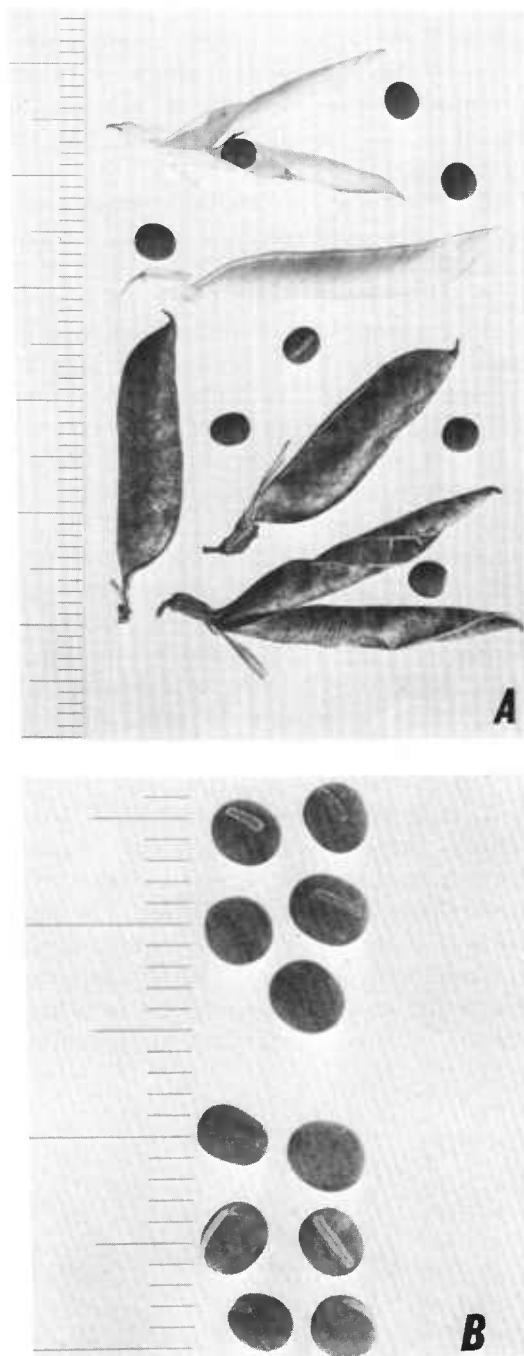
Seed subspherical, spherical, oblong; smooth; dull purplish brown to dull light brown to lighter brown, with scattered to dense dark-brown mottles and points; some seeds so densely speckled as to appear almost monochrome; medium; $3.5 \times 3.2 \times 2.9$ mm.

Hilum silvery because of funicular remnants, when funicular remnants absent, then color of seedcoat; lips of hilar groove color of hilum; without halo; oblong to slightly wedge shaped; five to six times longer than wide; occupying 20–33 percent of seed circumference.

Lens generally darker than seed; raised center from 1.3 to 2 mm. from hilum.

Legume light to dark straw color; glabrous, pubescent in small populations in Arizona, California, Oregon, and Washington; strongly reticulate; 35×6 mm.; terete to partially flattened; oblong; oblique and acute at both ends; stipe 4–5 mm. long; eight to 14 ovules; inner valve surface smooth; twisting loosely to tightly during dehiscence.

Notes.—This is the most common and widespread native North American vetch found from Quebec and New Jersey west to Alaska, California, and northern Mexico. Darker seeds are usually found in Pacific Coast States and lighter colored seeds from Rocky Mountains eastward. Gunn (1968) presents the most recent treatment of this species complex. Sixteen samples studied.



BN-37072, BN-37071
FIGURE 2.—*Vicia americana* Willd.: A, Legumes and seeds far western and eastern types; B, seeds far western and eastern types. Top (white legumes), C. R. Gunn 2631, Riverside Co., Calif. (ISC); bottom (blackened legumes), C. R. Gunn 2566, Story Co., Iowa (ISC).

Vicia angustifolia L.Narrowleaf Vetch
(Fig. 3)

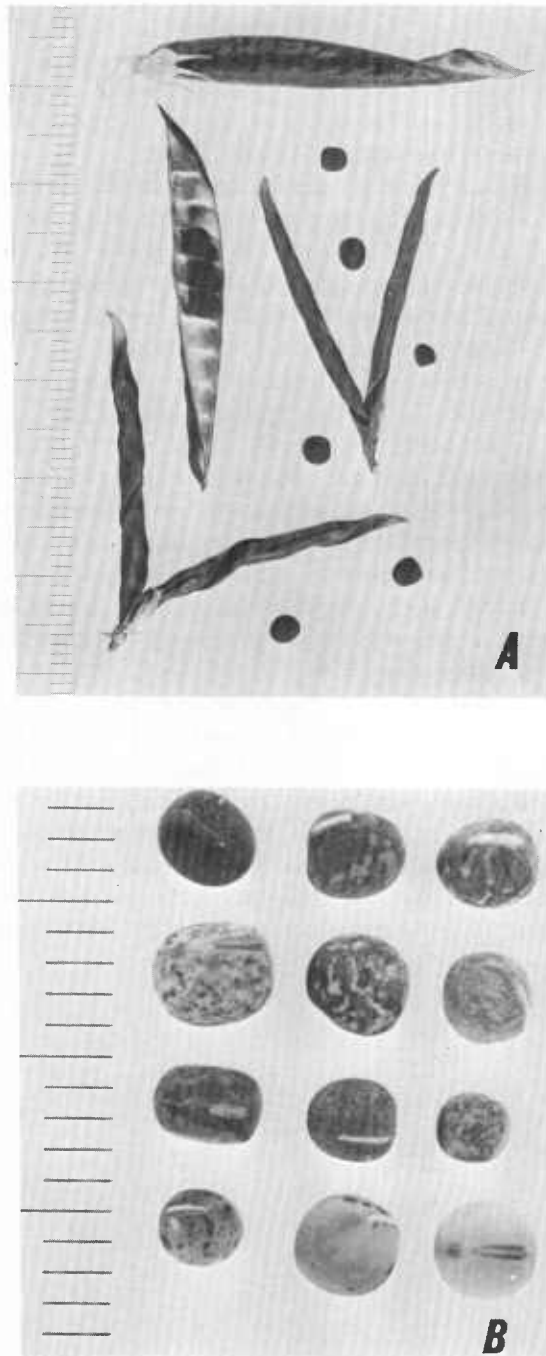
Seed rounded-squarish to subspherical; smooth; monochrome velvety purplish black, or monochrome straw to light reddish brown, or greenish straw to reddish straw, with scattered to dense mottles, points or streaks of dark brown or both; small to medium; 2.3–4 mm. in all dimensions.

Hilum straw to whitish, black on black-velvety seed, and black or brown on seed with greenish cast; lips of hilar groove usually strongly whitened, but black on black-velvety seed, and black or brown on seed with greenish cast; without halo; wedge to slight wedge shaped; three to five times longer than wide; occupying 16–21 percent of seed circumference.

Lens generally blackish, occasionally brown to nearly invisible; raised center from 0.5 to 1 mm. from hilum.

Legume black to dark brown; short pubescent becoming glabrate at maturity; punctate and reticulate; $35-50 \times 4-6$ mm.; terete; slender-oblong; oblique and acuminate at both ends; stipe absent; eight to 11 ovules; inner valve surface with fibrous cross-ribs; twisting tightly during dehiscence.

Notes.—Introduced from Europe. Naturalized and occasionally cultivated throughout United States, frequent along roadsides in southeastern and far western United States and in northern and central Mexico. The plants and seeds of *V. angustifolia* are similar to and often confused with those of *V. sativa*. In some botanical treatments *V. angustifolia* is made a variety of *V. sativa*. Thirty-four samples studied.



BN-37062, BN-37061
FIGURE 3.—*Vicia angustifolia* L.: A, Legumes and seeds; B, color range of seeds. A, C. R. Gunn 2832, Story Co., Iowa (ISC). B, C. R. Gunn 2832, 3570, 3569; 3582, 3563, 3568; 3154, 3505, 3565; 3525, 3564, 3508; greenhouse plants (NA).

Vicia articulata Hornem.Single-Flowered Vetch
(Fig. 4)

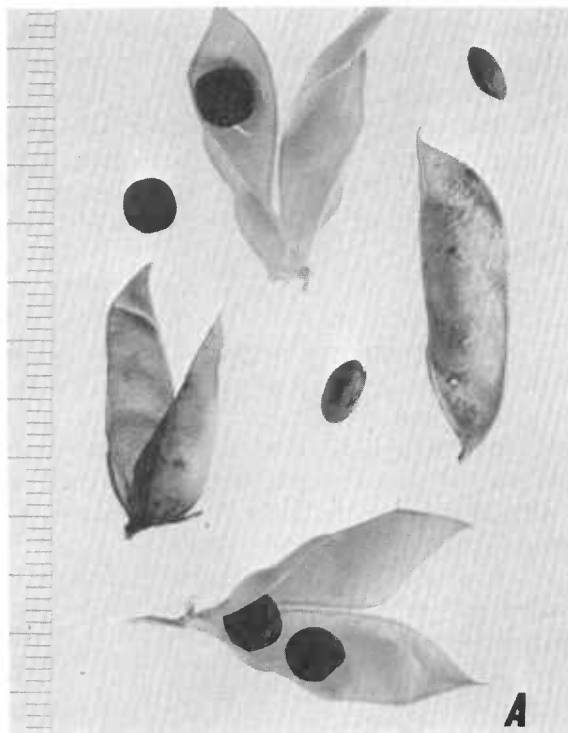
Seed lenticular; smooth; pale straw to reddish straw, with points, mottles, and streaks of light brown and blackish brown; medium; $5.5 \times 5.1 \times 2.7$ mm.

Hilum color of seedcoat; lips of hilar groove white; encompassed by lighter straw-colored halo; oblong to nearly linear; six to seven times longer than wide; occupying 10 percent of seed circumference.

Lens in fresh seed bright orange red to blood red or yellow, becoming darker red on older seed; raised center about 1.2 mm. from hilum.

Legume yellowish brown; glabrous; outer valve surface depressed between each seed, strongly reticulate; $15-30 \times 6-8$ mm.; flat; oblong; oblique acute at apex and base; stipe 1 mm.; two to four ovules; inner valve surface smooth; twisting slightly during what appears to be a tardy dehiscence.

Notes.—Introduced from southern Europe. Cultivated in Florida, Georgia, California, and Oregon. Not winter hardy. This seed is labeled *V. monantha* in Pierpoint (1949). Ten samples studied.



BN-37073, BN-37074
FIGURE 4.—*Vicia articulata* Hornem.: A, Legumes and seeds; B, seeds. C. R. Gunn 3521, greenhouse plant (NA).

Vicia benghalensis L.Purple Vetch
(Fig. 5)

Seed subspherical to sublenticular; smooth; brownish gray, with black mottles, often appearing as monochrome black brown due to dense mottling; medium; $5 \times 4.7 \times 3.5$ mm.

Hilum concealed by completely and permanently attached snow-white funiculus; without halo; nearly linear; seven times longer than wide; occupying 19 percent of seed circumference.

Lens black but easily located; center about 1.2 mm. from hilum.

Legume straw to brown; pubescent; outer valve surface depressed between each seed; $25-35 \times 8-12$ mm.; flattened; oblong to oblong-rhombic; oblique acute at apex, oblique rounded at base; stipe 1 mm.; four to five ovules; inner valve surface with fibrous cross-ribs; twisting slightly during tardy dehiscence.

Notes.—Native of southern Europe. Cultivated and naturalized in Pacific Coast States. Fifteen samples studied.

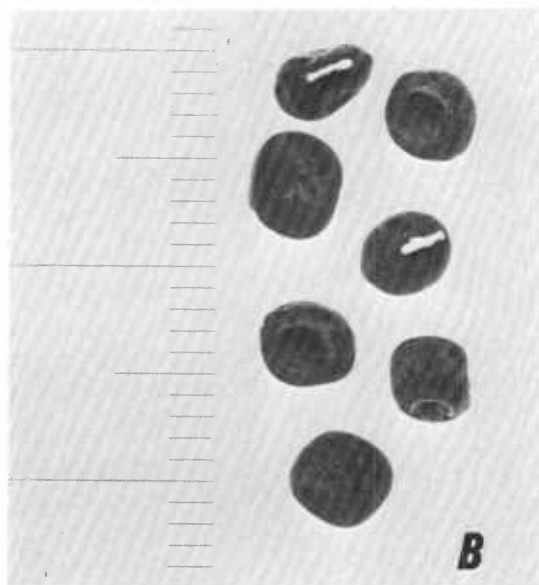
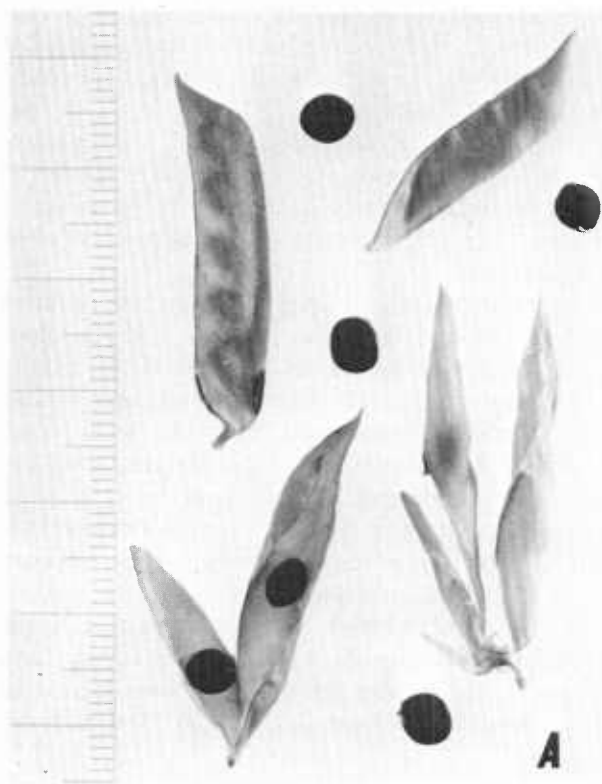


FIGURE 5.—*Vicia benghalensis* L.: BN-37060, BN-37059
A, Legumes and seeds; B, seeds. C. R. Gunn 3695, greenhouse plant (NA).

Vicia caroliniana Walt.Wood Vetch
(Fig. 6)

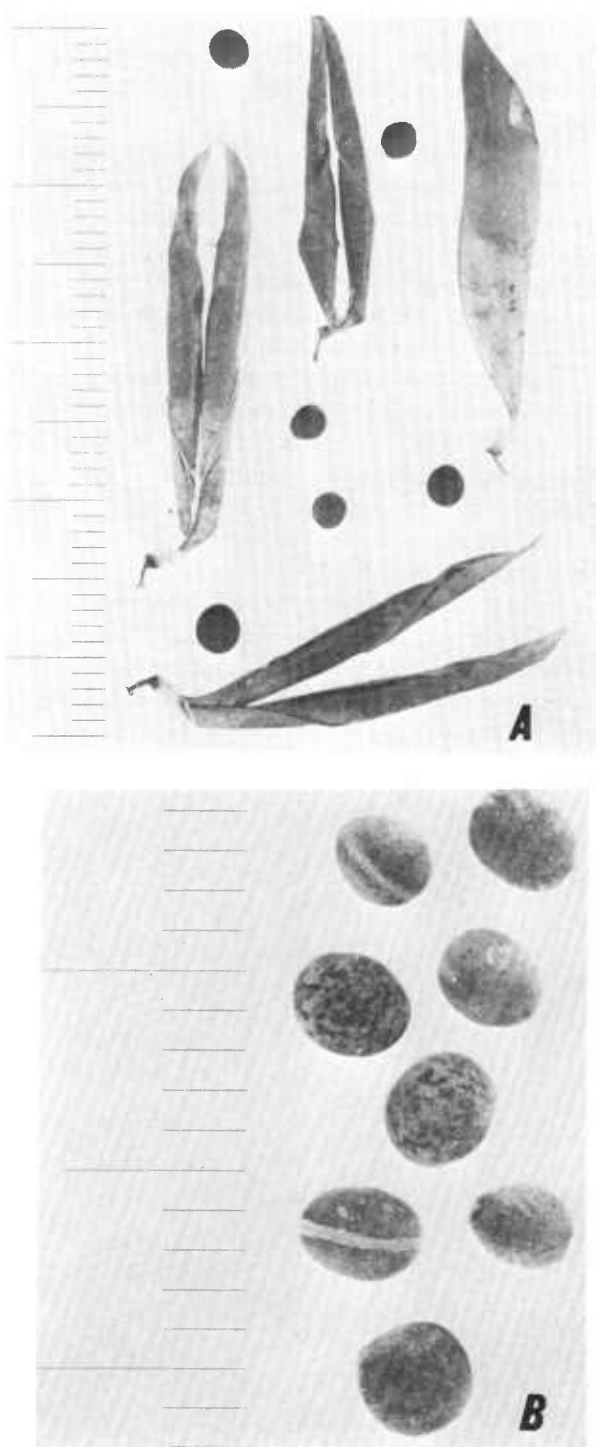
Seed subspherical to oblong; smooth; greenish brown to reddish brown, with few to many black mottles that may nearly obscure base color, thus seed appearing monochrome blackish brown; small; $2.4-2.9 \times 2.1-2.5 \times 2$ mm.

Hilum color of seedcoat; lips of hilar groove may be light brown; without halo; circumlinear; over 10 times longer than wide; occupying 75 percent of seed circumference.

Lens blackish; nearly confluent with hilum.

Legume straw to brown with greenish or purplish cast to blackish brown; glabrous; punctate and weakly reticulate; $15-30 \times 6$ mm.; terete to partially flattened; oblong; obliquely acuminate at both ends; stipe 2 mm.; four to 11 ovules; inner valve surface smooth; twisting tightly during dehiscence.

Notes.—Native east of Mississippi River and in Missouri, Arkansas, Oklahoma, Texas, and Louisiana. Usually found in fertile woods, thickets, and steep limestone roadcuts. This species appears to be closely related to *V. hugeri*, a poorly understood species of the Appalachian Mountains of South Carolina, Georgia, and Alabama. The seeds of *V. caroliniana* are identical to those of *V. hugeri*. Ten samples studied.



BN-37066, BN-37065
FIGURE 6.—*Vicia caroliniana* Walt.: A, Legumes and seeds; B, seeds. C. R. Gunn 3634, Macon Co., N.C. (NA, US).

Vicia cracca L.Boreal Vetch
(Fig. 7)

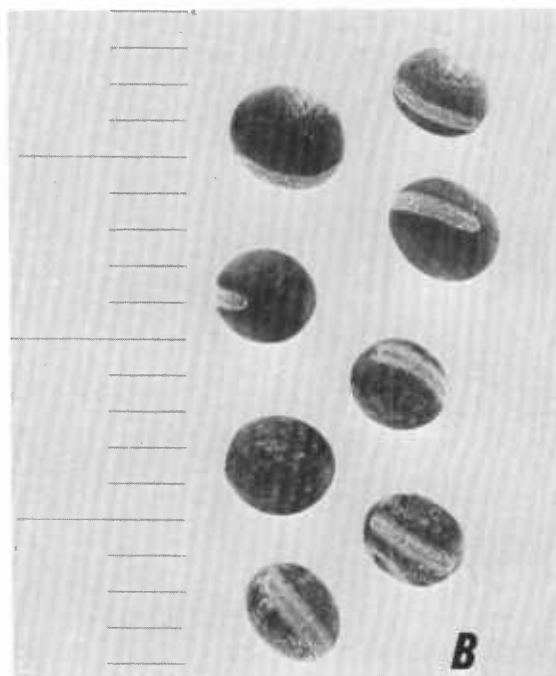
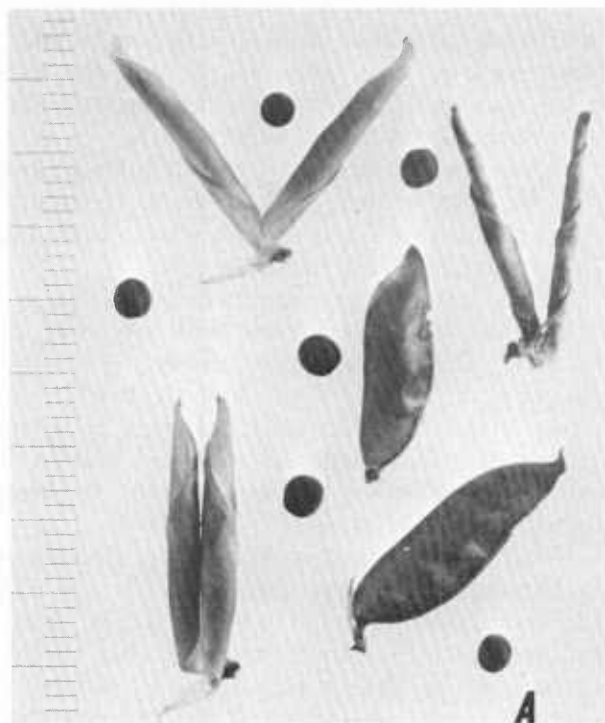
Seed subspherical to oblong; smooth; reddish brown, densely mottled with brown, nearly masking base color; medium; $3.2 \times 2.8 \times 2.6$ mm.

Hilum silvery because of funicular remnants or color of seedcoat if remnants absent; lips of hilar groove essentially color of hilum; without halo; linear; six times longer than wide; occupying 33 percent of seed circumference.

Lens only slightly discolored, small, difficult to locate; about 1 mm. from hilum.

Legume straw to brown with greenish cast to dark brown; glabrous; inconspicuously reticulate; $20-30 \times 4-7$ mm.; terete to partially flattened; obliquely acuminate at apex, obliquely rounded at base; stipe 1 mm.; four to seven ovules; inner valve surface smooth; twisting tightly during dehiscence.

Notes.—Circumpolar. Newfoundland to British Columbia, south to Virginia, Illinois, and Washington. The seed and legume descriptions are based on North American material. Twenty-eight samples studied.



BN-37063, BN-37064
FIGURE 7.—*Vicia cracca* L.: A, Legumes and seeds; B, seeds. C. R. Gunn 3543, Tolland Co., Conn. (NA, US).

Vicia dasycarpa Ten.Winter Vetch
(Fig. 8)

Seed oval, subspherical, oblong; smooth; dull reddish brown to grayish brown, obscurely mottled with slightly darker brown; medium; $4.7 \times 4 \times 3.5$ mm.

Hilum color of seedcoat; lips of hilar groove pale straw; usually encompassed by light-brown halo; oblong to slightly wedge shaped; three to four times longer than wide; occupying 13 per cent of seed circumference.

Lens darker than seedcoat, usually without raised center; center about 1.2 mm. from hilum.

Legume straw to brownish; puberulous; faintly reticulate; $20-40 \times 7-10$ mm.; flattened; oblong; apex beaked, base obliquely acuminate; stipe 3 mm.; three to five ovules; inner valve surface smooth; twisting loosely during dehiscence.

Notes.—Introduced from Europe. Naturalized and cultivated in southern and far western United States. This seed description applies to *V. dasycarpa* in the narrow sense because *V. villosa* var. *glabrescens* Koch is included under *V. villosa*. This interpretation does not follow Hermann (1960), who regarded *V. villosa* var. *glabrescens* as a synonym of *V. dasycarpa*. The seeds of var. *glabrescens* are identical to those of *V. villosa* and dissimilar to those of *V. dasycarpa*. *Vicia dasycarpa* seeds may be confused with those of *V. sativa* and *V. villosa*. Hillman (1933) illustrated the differences between seeds of *V. villosa* and *V. dasycarpa*. The plants of both are rather similar. However, neither plant is similar to that of *V. sativa*. Some taxonomists have combined *V. dasycarpa* and *V. villosa*, whereas others have retained them as separate species. The taxonomic status of *V. dasycarpa* is currently under investigation. The common name "woollypod vetch" is derived from the species name "*dasycarpa*." Unfortunately the legumes are not woolly and not even hairy. The common name "woollypod" should be dropped and replaced by winter vetch. Thirteen samples studied.

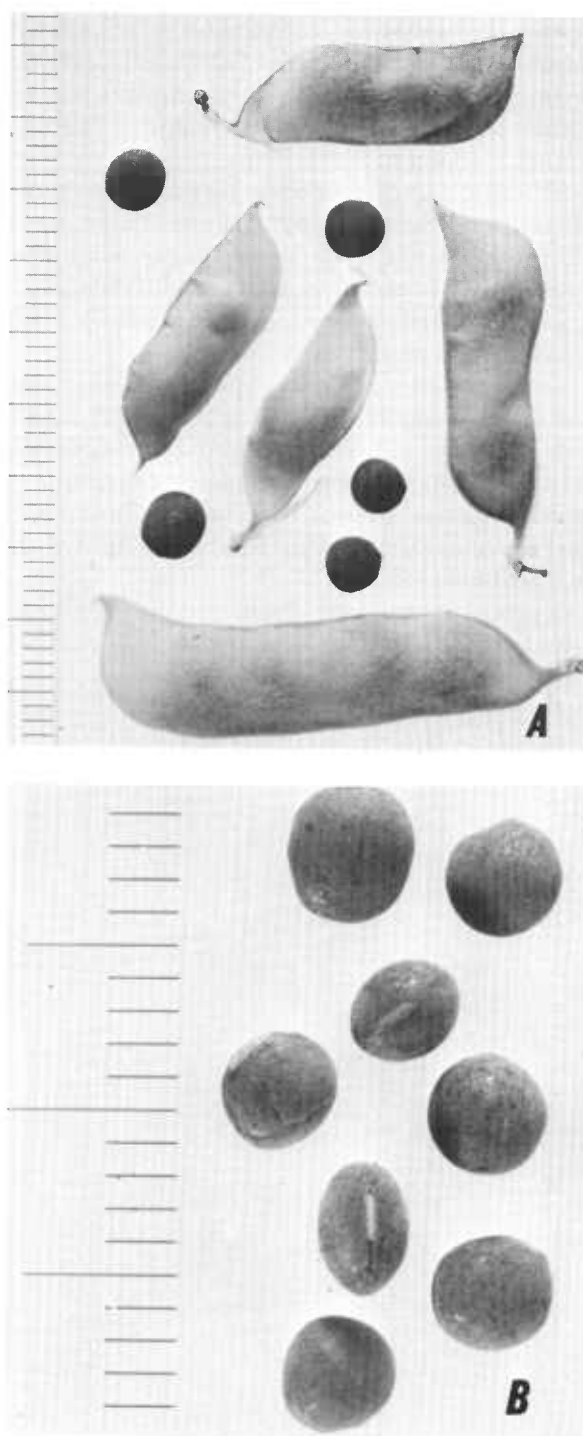


FIGURE 8.—*Vicia dasycarpa* Ten.: BN-37009, BN-37010
A, Legumes and seeds; B, seeds. C. R. Gunn 3696, greenhouse plant (NA, US).

Vicia disperma* DC.*Two-Seeded Vetch
(Fig. 9)**

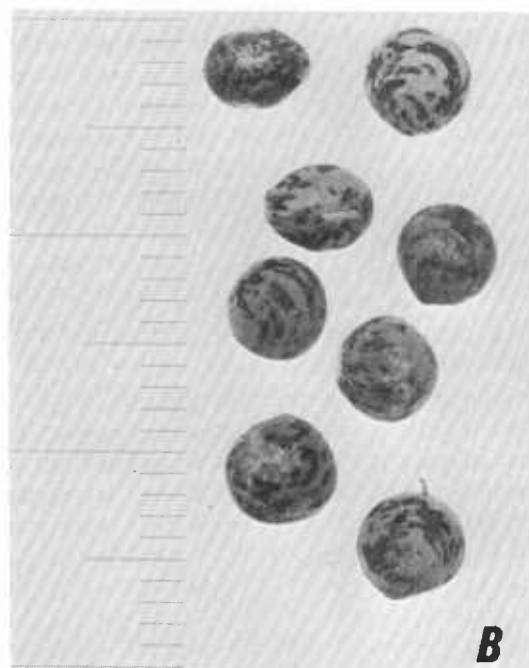
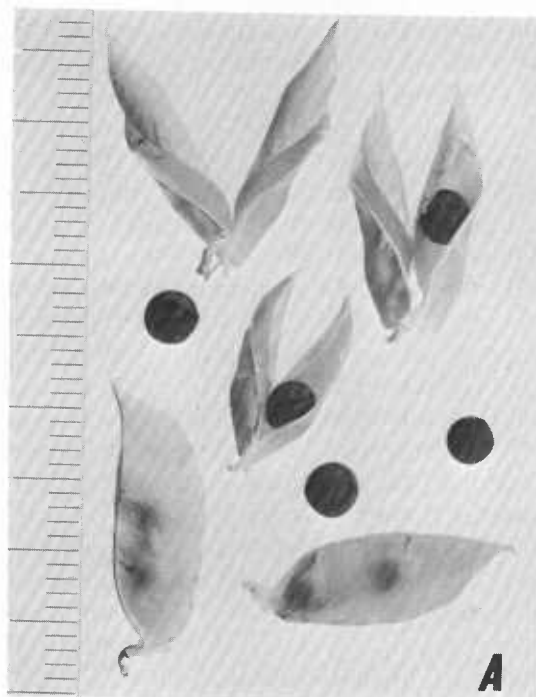
Seed subspherical to sublenticular; smooth; light bright reddish ocher, strikingly streaked with blackish brown, to monochrome blackish brown because of dense streaking; medium; $4.2 \times 4.2 \times 3.6$ mm.

Hilum color of seedcoat; lips of hilar groove straw; encompassed by orange halo; wedge shaped; three to four times longer than wide; occupying 12 percent of seed circumference.

Lens reddish to orange red; raised center from 0.8 to 1 mm. from hilum.

Legume straw colored; glabrous; weakly reticulate, occasionally with widely scattered knob-like processes; $14-22 \times 5-7$ mm.; flat; oblong or subrhomboidal; apex obliquely acuminate to rounded; stipe 2 mm.; two ovules; inner valve surface smooth; twisting loosely to tightly during dehiscence.

Notes.—Introduced from southern Europe. Locally adventive in California and southern United States. Seven samples studied.



BN-37054, BN-37053
FIGURE 9.—*Vicia disperma* DC.: A, Legumes and seeds; B, seeds. C. R. Gunn 3492, (larger seeds in B, 3496); greenhouse plants (NA).

Vicia ervilia (L.) Willd.Bitter Vetch
(Fig. 10)

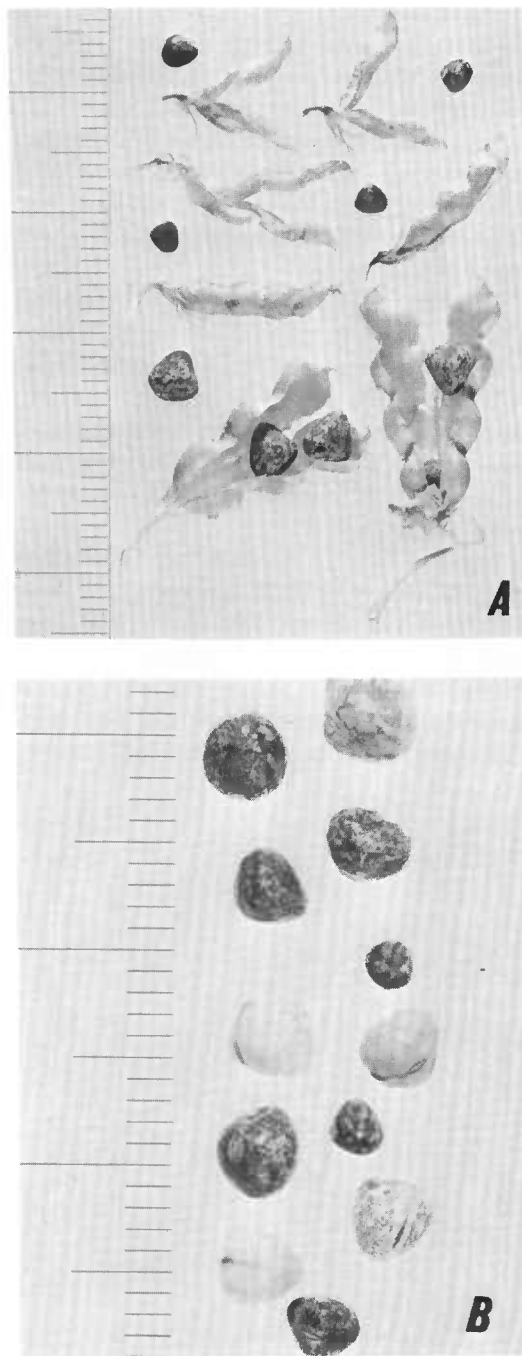
Seed pyramidal; smooth; nearly monochrome pale straw to reddish straw, to lightly marked with mottles and points only slightly darker than base color, to blackish brown, or light brown, densely mottled and streaked with dark blackish brown; medium; $3.2-5.6 \times 2.8-5 \times 2.7-4.8$ mm.

Hilum color of seedcoat or darker; difficult to locate on densely mottled and streaked seeds; lips of hilar groove pale straw; encompassed by light-brown halo, especially noticeable on speckled seeds; elliptical; two times longer than wide; occupying 8 percent of seed circumference.

Lens bright reddish to reddish brown; raised center from 2.2 to 2.6 mm. from hilum.

Legume straw to light brown; glabrous (occasionally with numerous nectariferous glands); reticulate, sometimes with few to numerous knoblike processes, and usually nearly moniliform, occasionally with pools of nectar in depressions; $12-25 \times 2-5$ mm.; terete to slightly flattened; oblong; apex abruptly acuminate, base long acuminate; stipe absent; two to four ovules, rarely one ovule; inner valve surface smooth; twisting loosely to tightly during dehiscence.

Notes.—Introduced from southern Europe. Cultivated in Pacific Northwest. Twenty-one samples studied.



BN-37051, BN-37052
FIGURE 10.—*Vicia ervilia* (L.) Willd.: A, Legumes and seeds; B, seeds. A, Top (smaller legumes and seeds), Jones and Keller 218, environs of Tbilisi Park, Russia; bottom (larger legumes and seeds), C. R. Gunn 3167, greenhouse plant (NA). B, seeds identified by comparison identification.

Vicia exigua Nutt.Slender Vetch
(Fig. 11)

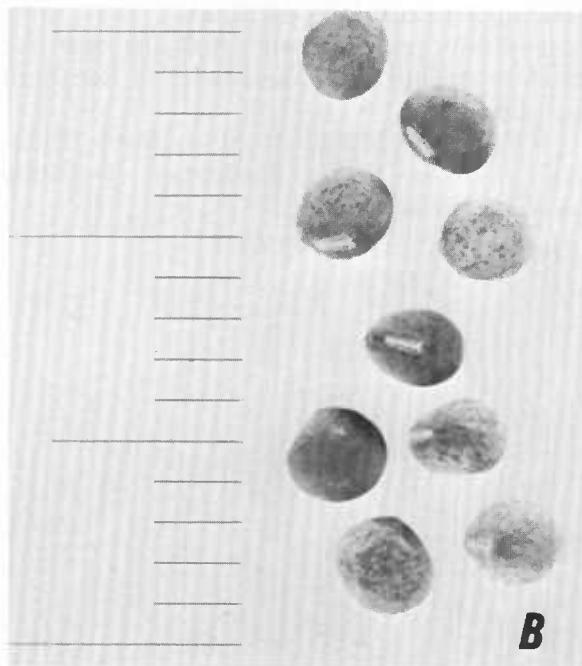
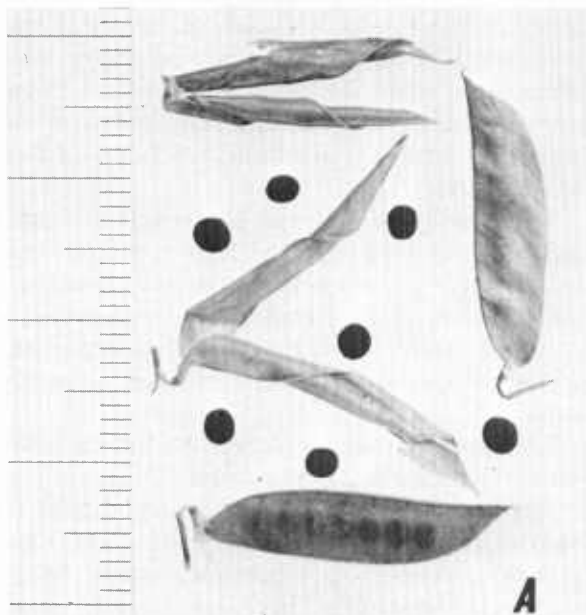
Seeds spherical to subspherical; smooth; dull, medium to dark brown or gray brown, sparingly to densely mottled with darker brown or uniformly gray brown; small; 2–2.5 mm. in all dimensions.

Hilum color of seedcoat or lighter; lips of hilar groove lighter than hilum; with or without faint halo; slightly wedge shaped; six times longer than wide; occupying 14–17 percent of seed circumference.

Lens blackish; raised center 0.5 mm. from hilum.

Legume straw to brown; glabrous; strongly reticulate; 20–30×4–6 mm.; partially flattened; oblong; obliquely acuminate at both ends; stipe 2 mm.; four to eight ovules; inner valve surface smooth; twisting tightly during dehiscence.

Notes.—Native from Utah to southern Oregon, south to Mexico, exclusive of Texas and southeastern New Mexico. This species is treated in a narrower sense than Hermann (1960), because *V. leavenworthii* var. *occidentalis* Shinnery is not recognized as a synonym of *V. exigua*. Seven samples studied.



BN-37049, BN-37050
FIGURE 11.—*Vicia exigua* Nutt.: A, Legumes and seeds;
B, seeds. G. J. Harrison and T. H. Kearney 8577,
Fresnal Canyon, Ariz. (ARIZ).

Vicia faba L.Horse Bean
(Fig. 12)

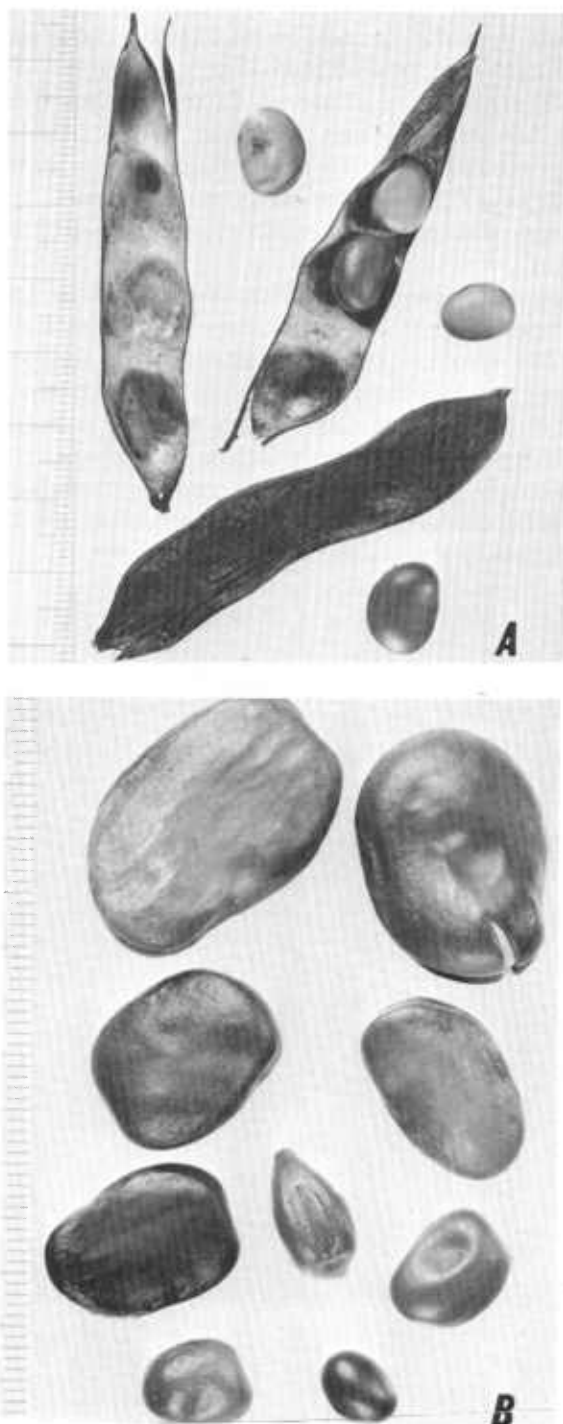
Seed oblong to oval, flattened or rounded; smooth; bright reddish brown, light to dark greenish brown, or light to dark purple, all obscurely mottled and pointed with colors similar to base colors; large; $6.5-17 \times 7-30.5 \times 4.5-9$ mm.

Hilum blackish to brown, completely or partially covered by scurfy remnants of funiculus; funiculus occasionally remaining attached at one point, easily sloughed off; hilar groove often white; without halo; elliptical in smaller seed, oblong in larger seed; from three to six times longer than wide; occupying about 18 percent of seed circumference.

Lens conspicuous brown; raised center 3.6–12.9 mm. from hilum depending on seed size.

Legume greenish black or brown to black; glabrous; reticulate; $80-200 \times 10-30$ mm.; plump (inflated); terete or flattened; oblong; obliquely acuminate at both ends; style usually permanent; stipe 4 mm.; three to four ovules; inner valve surface with fibrous cross-ribs; twisting loosely or occasionally rather tightly during dehiscence.

Notes.—Introduced from northern Africa and southwestern Asia. Locally grown as a vegetable and stock feed. The several varieties and cultivars used in agriculture have a wide range of seed colors and sizes. This unique vetch seed is the largest in the genus. Several authors have proposed that *V. faba* be placed in its own genus, *Faba*. The generic disposition of *V. faba* has been open to question and remains unsettled. Forty-one samples studied.



BN-37044, BN-37043
FIGURE 12.—*Vicia faba* L.: A, Legumes and seeds; B, seeds. A, C. R. Gunn 3697, greenhouse plant (NA). B, C. R. Gunn 3481, 3481; 3479, 3488; 3482, (hilum of 3481), 3151; 3483, 3480; greenhouse plants (NA).

Vicia floridana S. Wats.Florida Vetch
(Fig. 13)

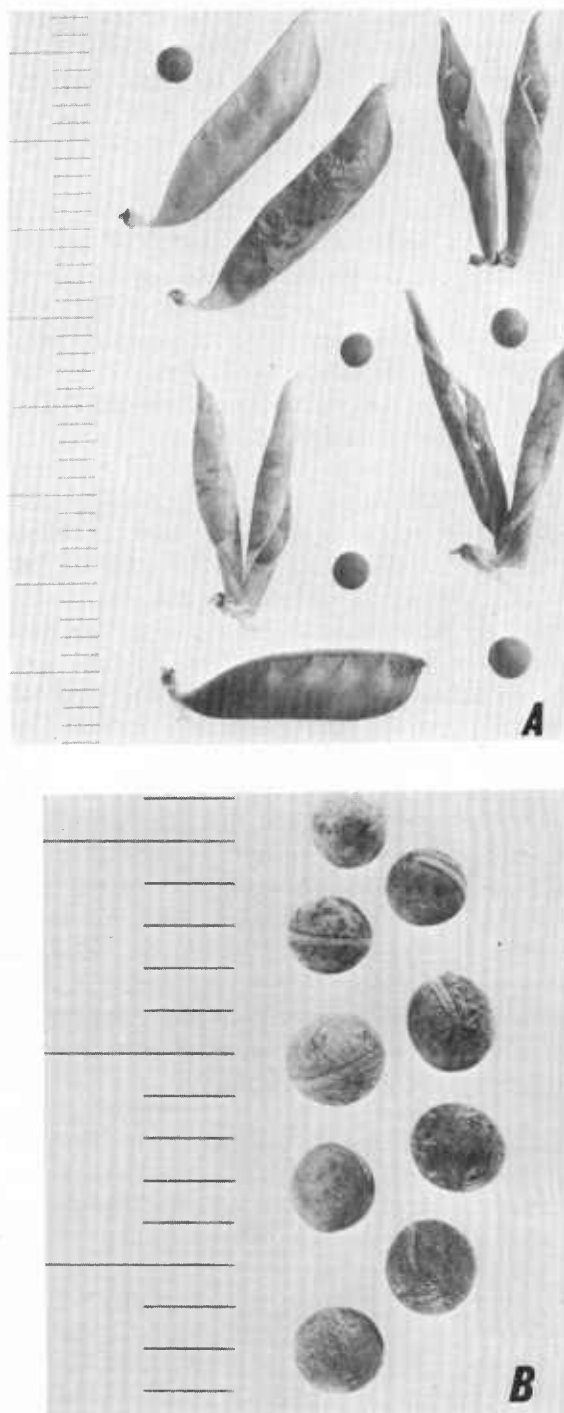
Seed spherical; smooth; ocher to reddish brown, usually marked with blackish mottles; small; 2.2 mm. in all dimensions.

Hilum color of seedcoat, inconspicuous; lips of hilar groove color of hilum; without halo; circumlinear; over 10 times longer than wide; occupying 75 percent of seed circumference.

Lens darker than seedcoat; confluent with hilum.

Legume straw to blackish brown with greenish cast; glabrous; punctate and reticulate; 10-13×4 mm.; partially flattened; oblong; obliquely acuminate at both ends; stipe 2 mm.; one to four ovules; inner valve surface smooth; twisting loosely to tightly during dehiscence.

Notes.—Native of central and northeastern Florida. Closely related to *V. acutifolia* and *V. ocalensis*. Six samples studied.



BN-37048, BN-37047
FIGURE 13.—*Vicia floridana* S. Wats.: A, Legumes and seeds; B, seeds. C. R. Gunn 3348, Taylor Co Fla. (NA, US).

Vicia gigantea Hook.Large Vetch
(Fig. 14)

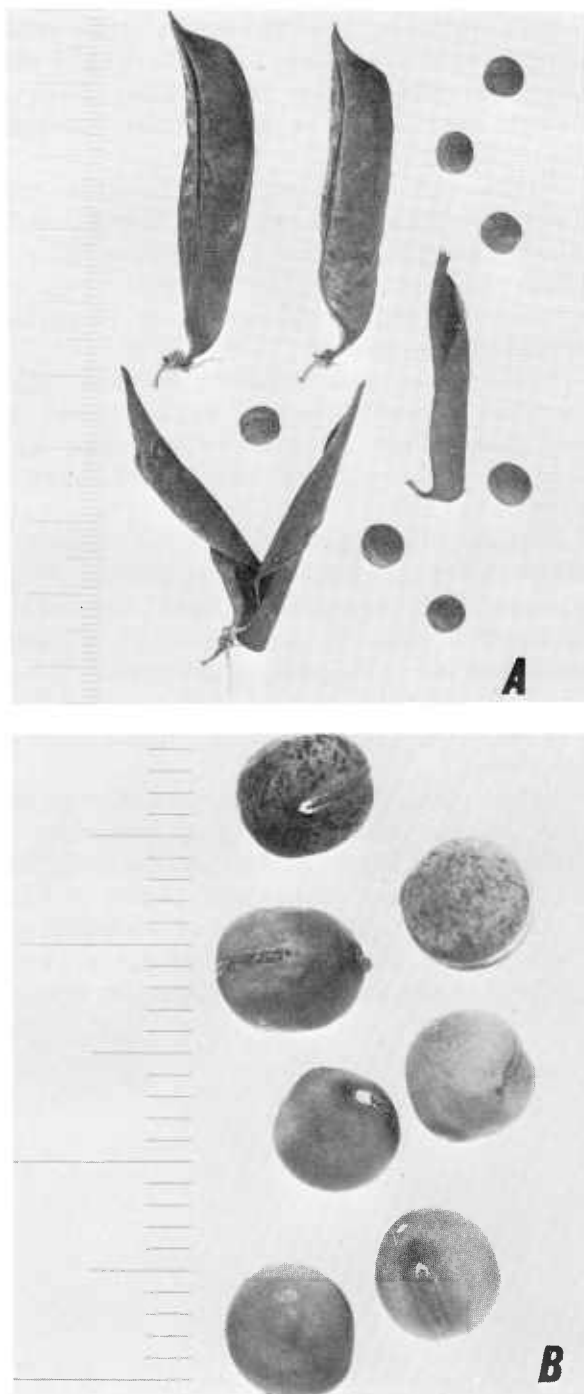
Seed spherical to subspherical; smooth; ocher to reddish ocher, moderately to densely mottled and pointed with darker brown, occasionally markings so dense as to appear monochrome dark brown, or some seeds monochrome light, bright reddish brown; medium to large; $6.4 \times 6.3 \times 5.2$ mm.

Hilum color of seedcoat; lips of hilar groove color of hilum; without halo; circumlinear; over 10 times longer than wide; occupying 75 percent of seed circumference.

Lens darker than seedcoat, small; raised center 0.5 mm. from hilum.

Legume blackish brown to black; glabrous; inconspicuously reticulate; $30-40 \times 10-11$ mm.; terete; oblong; obliquely acuminate at both ends; stipe 4 mm.; four to seven ovules; inner valve surface smooth; twisting loosely, occasionally tightly, during dehiscence.

Notes.—Native from Sitka, Alaska, to San Francisco Bay, Calif., along beaches, highways, streams, and in thickets. Restricted to coast except for inland intrusion along Columbia River and into Willamette Valley, Oreg. *Vicia menziesii* Sprengel, a close relative of *V. gigantea*, is an extinct species from the high mountains of Hawaii. The seeds of these two species are similar. For a detailed discussion of *V. menziesii*, see Gunn (1970b). Sixteen samples studied.



BN-37046, BN-37045
FIGURE 14.—*Vicia gigantea* Hook.: A, Legumes and seeds; B, seeds. A, C. R. Gunn and C. E. Smith, Jr., 3670, Clallam Co., Wash. (NA, US); B, C. R. Gunn and C. E. Smith, Jr., 3673, Grays Harbor Co., Wash. (NA, US).

Vicia grandiflora Scop. var. *kitaibeliana* W. KochBigflower Vetch
(Fig. 15)

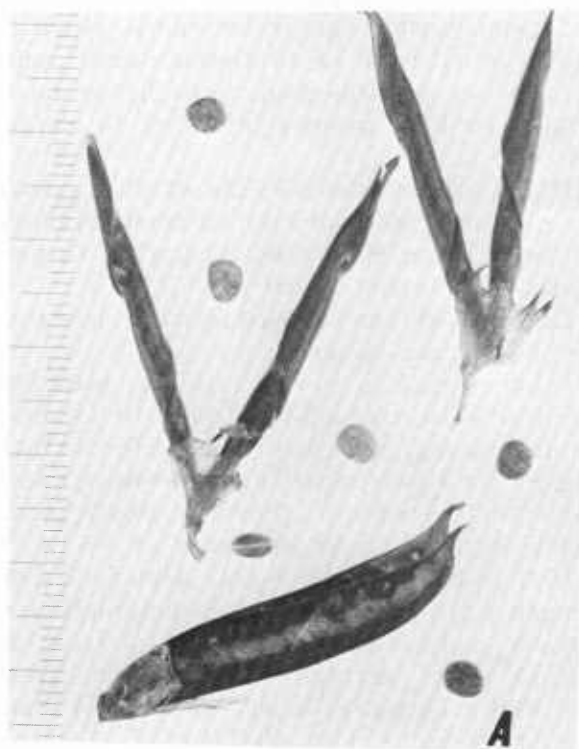
Seed lenticular; smooth; bright straw monochrome, or bright straw, lightly to densely mottled and pointed with black, some seeds so densely marked as to be blackish; medium; $3-4 \times 3.2 \times 2.3$ mm.

Hilum color of seedcoat, with funicular remnants remaining along margin as minute, white, parallel fringes; lips of hilar groove color of hilum; without halo; circumlinear; over 10 times longer than wide; occupying 75 percent of seed circumference.

Lens darker than seedcoat to same color, therefore almost invisible; raised center 0.5 mm. from hilum, occasionally confluent; large saddle-shaped discolored area at other end of hilum is not lens.

Legume black; puberulent with whitish to golden hairs and nectariferous glands, giving legumes dusty appearance; weakly reticulate; $35-50 \times 6-8$ mm.; flattened; oblong; obliquely acuminate at both ends; stipe absent; 10-16 ovules; inner valve surface with poorly defined fibrous cross-ribs; twisting tightly during dehiscence.

Notes.—Introduced from eastern Europe and Asia Minor. Naturalized along roadsides in southeastern United States. Shinnars (1956) assigned all these naturalized plants to variety *kitaibeliana* on the basis of leaflet shape. The seed and legume characters apply to the species and the variety. Eight samples studied.



BN-37055, BN-37056
FIGURE 15.—*Vicia grandiflora* Scop. var. *kitaibeliana* W. Koch: A, Legumes and seeds; B, seeds. A, C. R. Gunn 3311, Jasper Co., Ga. (NA, US); B, seeds identified by comparison identification.

Vicia hirsuta (L.) S. F. GrayTiny Vetch
(Fig. 16)

Seed subspherical to spherical to sublenticular; smooth; glossy, greenish straw to reddish straw, lightly to densely mottled with dark brown, some seeds nearly monochrome because of dense mottling; seeds tending to become dull reddish brown with age; small; $1.5-2.5 \times 1.4-2.3 \times 1.3-2.8$ mm.

Hilum usually concealed by shiny, chocolate-colored funiculus attached at one end of hilum; if exposed, hilum light to dark brown; lips of hilar groove ocher; without halo; nearly linear to slightly wedge shaped; six to nine times longer than wide; occupying 14-21 percent of seed circumference.

Lens darker than seedcoat; raised center from 0.6 to 1 mm. from hilum.

Legume brown to blackish with greenish cast; scabrous; obscurely reticulate; $6-10 \times 3-4$ mm.; flattened; oblong; obliquely short-acuminate to nearly rounded at both ends; stipe absent; two, rarely one or three, ovules; inner valve surface smooth; twisting loosely to tightly during dehiscence.

Notes.—Introduced from Europe. Naturalized through United States, Canada, and at least northern Mexico, along roadsides and in waste places. Thirty-three samples studied.



FIGURE 16.—*Vicia hirsuta* (L.) S. F. Gray: A, Legumes and seeds; B, seeds. C. R. Gunn 2693, Humboldt Co., Calif. (ISC).

BN-37068, BN-37067

Vicia hugeri SmallVetchling
(Fig. 17)

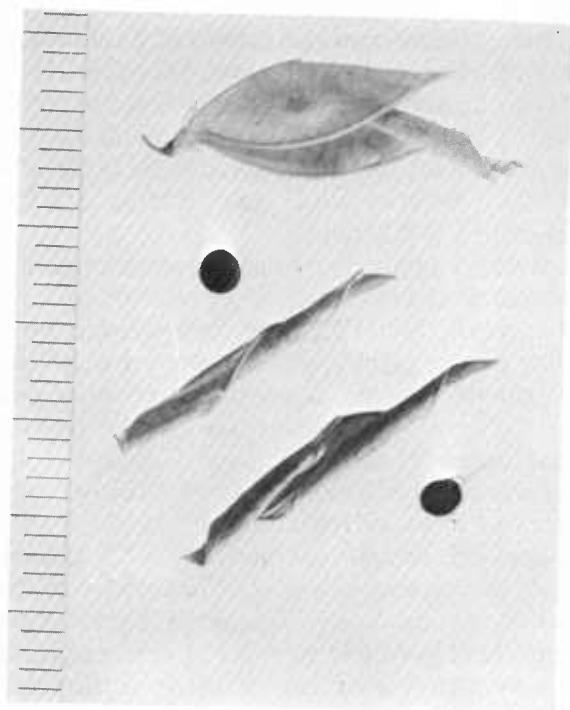
Seed subspherical; smooth; monochrome dark purplish; small; $2.4 \times 2.4 \times 2$ (ca.) mm.

Hilum brown; lips of hilar groove may be light brown; without halo; circumlinear; over 10 times longer than wide; occupying 75 per cent of seed circumference.

Lens darker than seedcoat; nearly confluent with hilum; raised center 0.3 mm. or less from hilum.

Legume light to dark brown; glabrous; punctate and weakly reticulate; $18-22 \times 5$ mm.; partially flattened; oblong; obliquely acuminate at both ends; stipe 1.5 mm. long; four to eight ovules; inner valve surface smooth; twisting tightly during dehiscence.

Notes.—Native of South Carolina, Georgia, and Alabama. Rare in the Piedmont. Found in open woods. Apparently closely related to *V. caroliniana*, whose seeds cannot be distinguished from those of *V. hugeri*. Hermann (1960, p. 4) keys out this species as a one-seeded annual species. The species is a perennial with several seeds, four to eight ovules. The taxonomic status of *V. hugeri* is under investigation. One sample studied.



BN-37006
FIGURE 17.—*Vicia hugeri* Small: Legumes and seeds.
A. H. Curtiss 6781, De Kalb Co., Ga. (US). (Seeds
were flattened when pressed.)

Vicia humilis HBK.Low Vetch
(Fig. 18)

Seed spherical to subspherical; smooth; blackish gray to greenish ocher, densely mottled with black, nearly masking base color; small; 2-2.3 mm. in all dimensions.

Hilum color of seedcoat; funicular remnants usually adhering to surface and margin; lips of hilar groove color of hilum; without halo; oblong; four times longer than wide; occupying 30 percent of seed circumference.

Lens darker than seedcoat; raised center 0.5-0.7 mm. from hilum.

Legume pale straw; glabrous; faintly reticulate and faintly punctate; 30-40×5-6 mm.; nearly terete; linear-falcate; obliquely acuminate at both ends; stipe 1 mm.; seven to eight ovules; inner valve surface smooth; twisting tightly during dehiscence.

Notes.—This is the most common and widespread native Mexican vetch found from Chihuahua and Tamaulipas south to Oaxaca and Chiapas and into northern Guatemala. Usually occurring above 2,000 meters, this species is found in wet meadows, pine woods, and wooded ravines. Five samples studied.

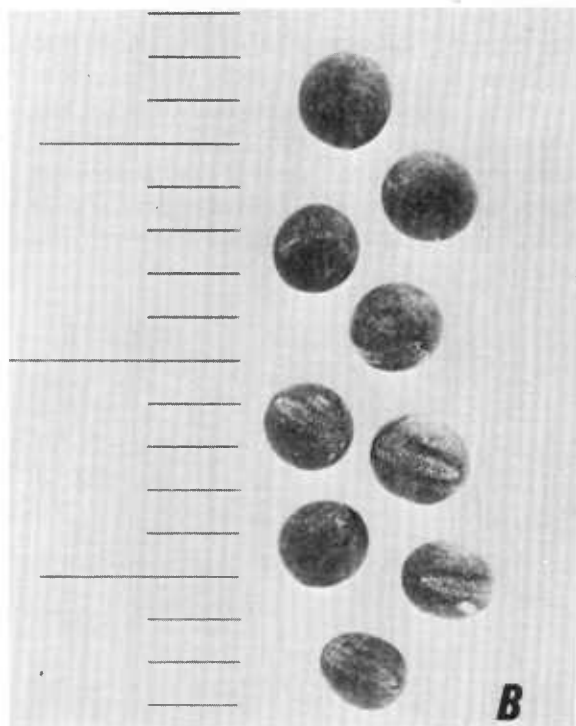
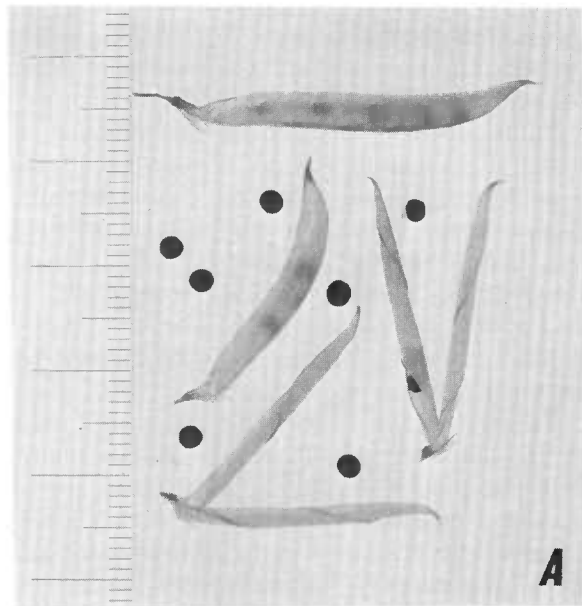


FIGURE 18.—*Vicia humilis* HBK.: BN-37058, BN-37057
A, Legumes and seeds; B, seeds. C. R. Gunn 3668, greenhouse plant (NA).

Vicia hybrida L.Hairy Yellow Vetch
(Fig. 19)

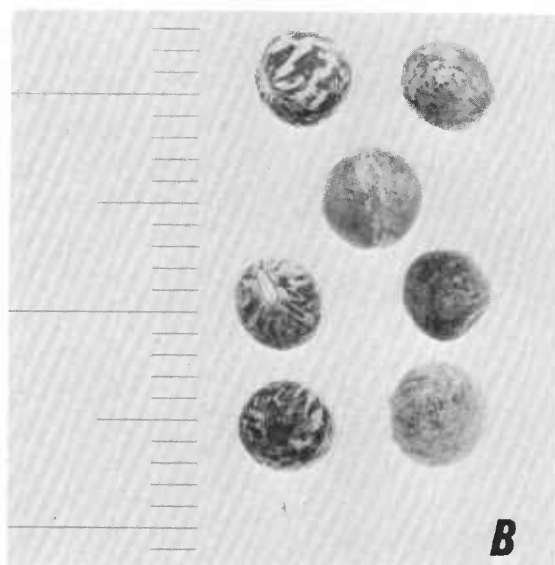
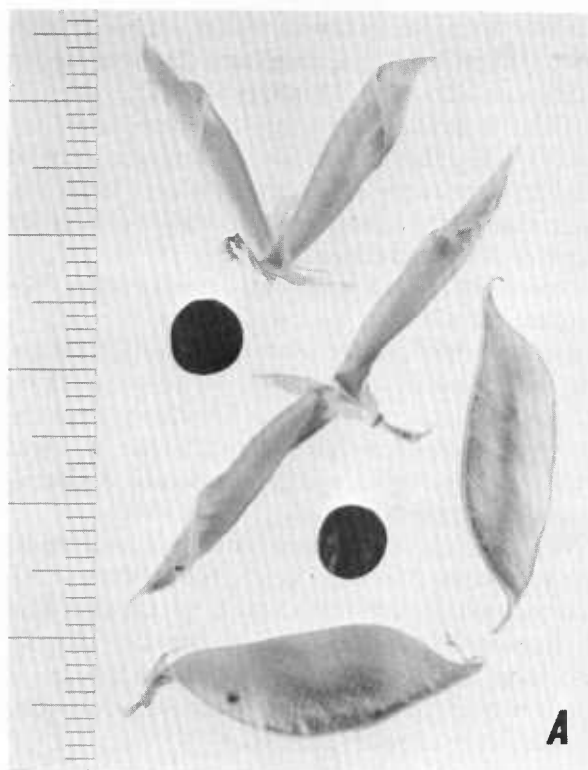
Seed spherical to subspherical; smooth to moderately rugose; rosy to almost orange, prominently streaked and mottled with blackish brown; medium; $4.5-5.5 \times 4.8 \times 4-5$ mm.

Hilum often silvery because of funicular remnants, if remnants absent then color of seedcoat; lips of hilar groove pale straw or color of seedcoat especially when hilum is silvery; without halo; slightly wedge shaped to oblong; three times longer than wide; occupying 13 percent of seed circumference.

Lens blackish; on opposite side of seed from center of hilum.

Legume straw colored; velutinous, usually with pustulate hair bases; smooth to slightly depressed between seeds; reticulate, pustules may be present; $25-30 \times 7-8$ mm.; oblong-rhomboidal; obliquely acuminate at both ends; stipe 2 mm.; five to six ovules; inner valve surface smooth; twisting tightly to loosely during dehiscence.

Notes.—Introduced from Europe. Occasionally found in Oregon. In figure 19, *B*, the two seeds on the top are smooth, whereas the four seeds on the bottom are moderately rugose. The single seed in the middle is a chimera. The central light-colored band is nearly smooth, and the area on either side is moderately rugose. All seeds came from one sample. Nineteen samples studied.



BN-37008, BN-37007
FIGURE 19.—*Vicia hybrida* L.: A, Legumes and seeds; B, seeds. A, C. R. Gunn 3172, greenhouse plant (NA); B, C. R. Gunn 3692, greenhouse plant (NA).

Vicia lathyroides L.Spring Vetch
(Fig. 20)

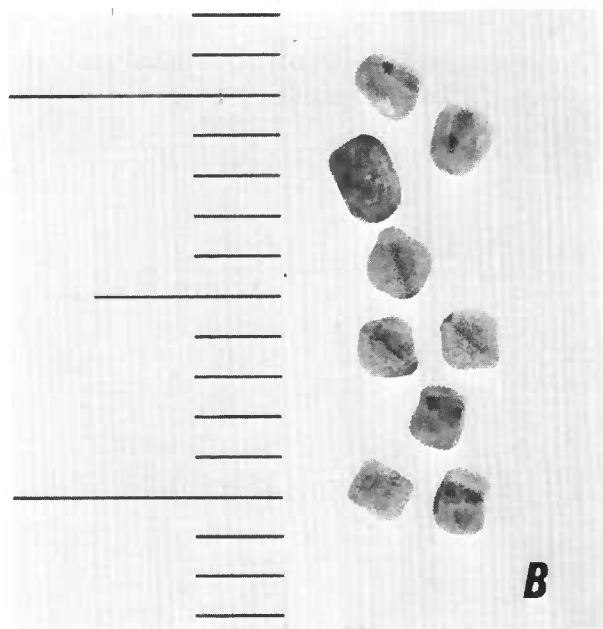
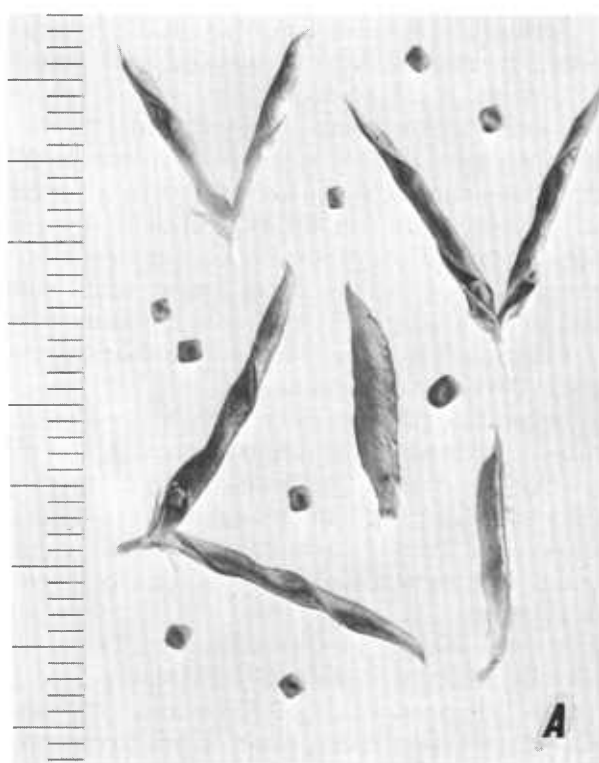
Seed cuboidal; pusticulate; light to dark dull straw, faintly mottled, darker than seedcoat; small; $1.7 \times 2 \times 1.5$ mm.

Hilum light brown to chocolate colored; lips of hilar groove color of hilum; encompassed by halo composed of light-brown to chocolate-colored pustules; elliptical; about two times longer than wide; occupying from 6 to 9 percent of seed circumference.

Lens center light brown to chocolate colored surrounded by similarly colored pustules; raised center 0.3–0.5 mm. from hilum; occasionally confluent with hilum.

Legume straw to brown to blackish; glabrous or glabrate; reticulate and punctate; $15-30 \times 3-4$ mm.; terete; linear-rhomboidal; oblique; acuminate at both ends, almost beaked at apex; stipe absent; six ovules; inner valve surface with faint to moderately strong fibrous cross ribs; twisting tightly during dehiscence.

Notes.—Sporadically adventive from Europe in sandy areas of eastern United States. Several samples studied.



BN-37024, BN-37023
FIGURE 20.—*Vicia lathyroides* L.: A, Legumes and seeds; B, seeds, C. R. Gunn 3498, greenhouse plant (NA).

Vicia leavenworthii Torr. & GrayTexas Vetch
(Fig. 21)

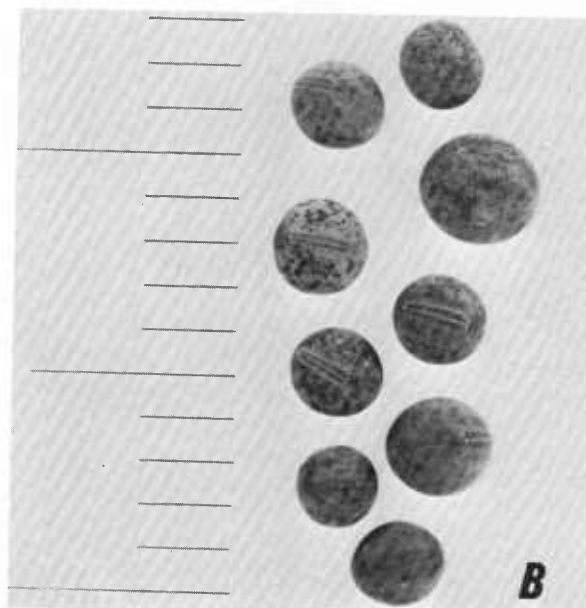
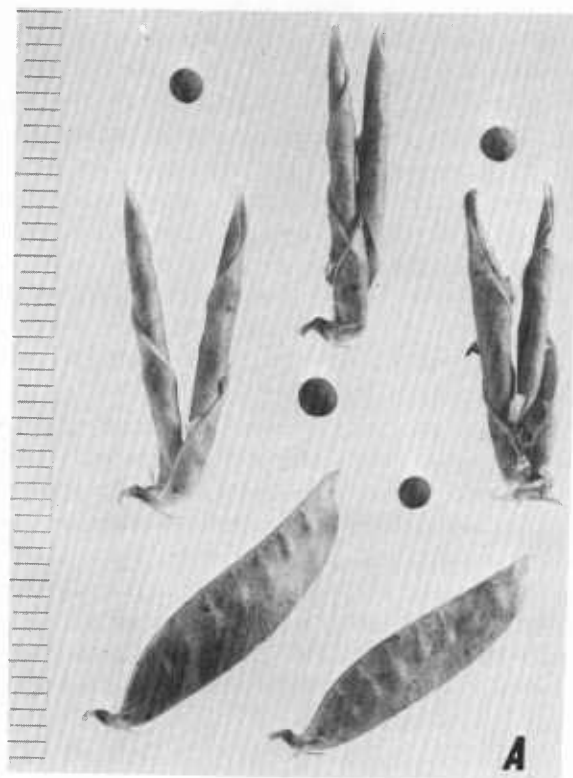
Seed subspherical; smooth; dull, greenish-ocher to reddish brown, mottled with darker brown; small; $2.5 \times 2.8 \times 2.5$ mm.

Hilum darker than seedcoat; lips of hilar groove straw colored to color of hilum in dull greenish-ocher seed, lips usually color of hilum in darker seed; usually encompassed by yellowish to orange-yellow halo; slightly wedge shaped; three to four times longer than wide; occupying 19–21 percent of seed circumference.

Lens darker than seedcoat; raised center about 0.6 mm. from hilum.

Legume straw to dark brown to blackish brown; glabrate to glabrous; punctate and obscurely reticulate; $20-25 \times 5-7$ mm.; flattened; rhombic-oblong; obliquely acuminate at both ends; stipe 1 mm.; three to eight ovules; inner valve surface smooth; twisting tightly during dehiscence.

Notes.—Native of Oklahoma and Texas, especially common in Edwards Plateau region of Texas. The parameters of *V. leavenworthii* and *V. ludoviciana* are not clear. Each taxonomist who has worked with these species has presented an original interpretation. The taxonomic status of these species is under investigation. The seed characters of both are based on typical specimens. Twelve samples studied.



BN-37021, BN-37022
FIGURE 21.—*Vicia leavenworthii* Torr. & Gray: A, Legumes and seeds; B, seeds. C. R. Gunn 3698, greenhouse plant (NA, US).

Vicia leucophaea GreeneMogollon Vetch
(Fig. 22)

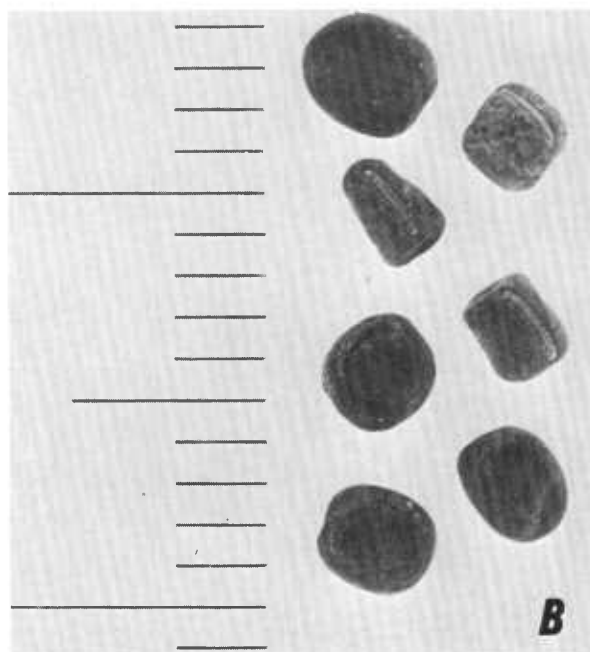
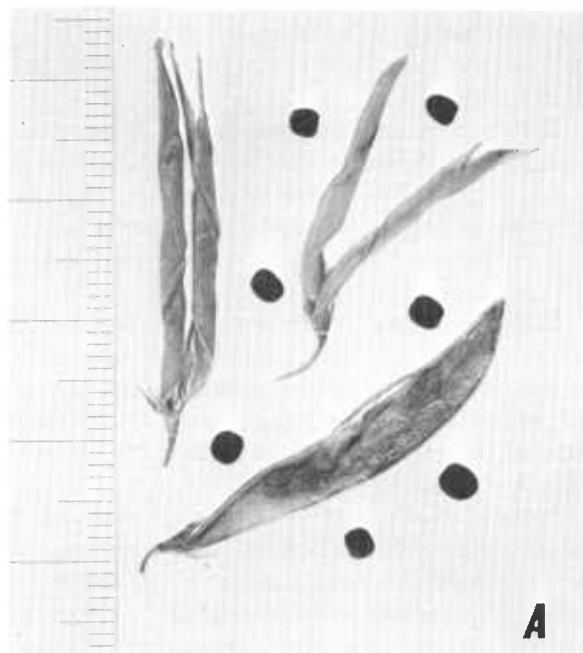
Seed subspherical to squarish; smooth; monochrome dull dark brown or greenish ocher, mottled with dark brown; small; $2.6 \times 2.4 \times 2$ mm.

Hilum brown; oblong; lips of hilar groove color of hilum; without halo; six times longer than wide; occupying 23 percent of seed circumference.

Lens black; raised center about 1 mm. from hilum.

Legume straw to brown; appressed villous; obscurely reticulate; $25-40 \times 5$ mm.; flattened; lanceolate-oblong; obliquely acuminate at both ends to almost beaked at both ends; stipe almost absent, less than 0.5 mm.; eight to 10 ovules; inner valve surface smooth; twisting tightly during dehiscence.

Notes.—Native in mountains of southwestern New Mexico, southeastern Arizona, and northern Mexico. Twelve samples studied.



BN-37018, BN-37017
FIGURE 22.—*Vicia leucophaea* Greene: A, Legumes and seeds; B, seeds. C. G. Pringle 1593, Chihuahua, Mexico (NY, US).

***Vicia ludoviciana* Nutt.**Deerpea Vetch
(Fig. 23)

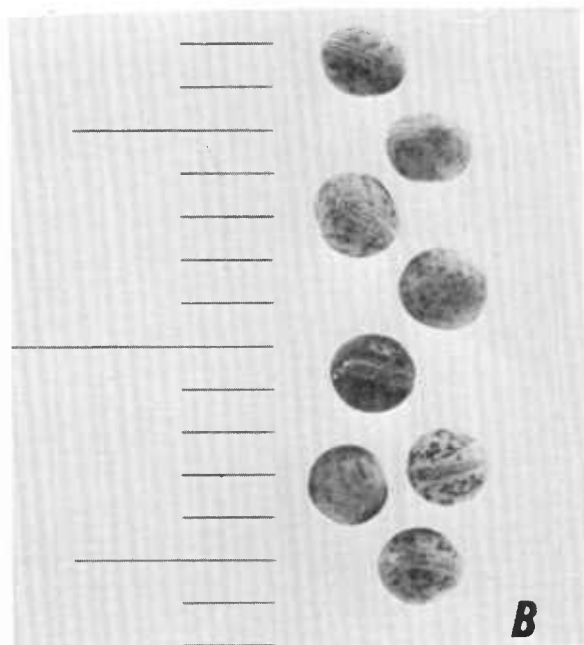
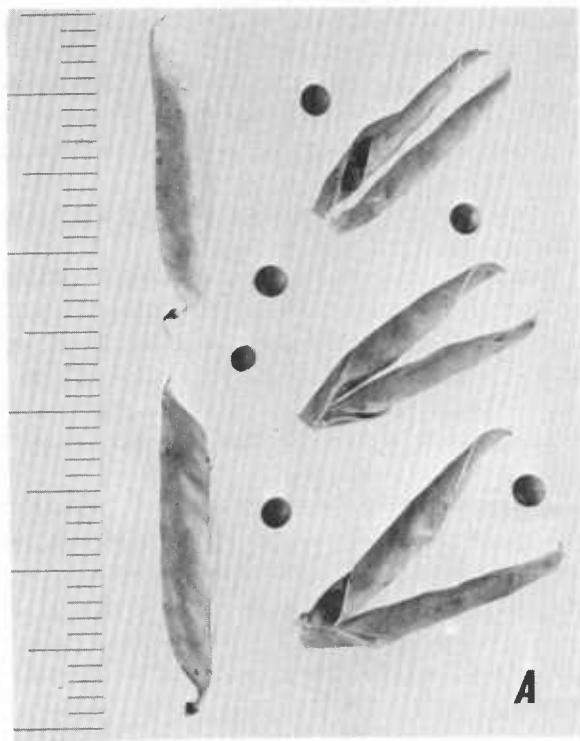
Seed spherical to subspherical; smooth; light greenish ocher to reddish brown, mottled and pointed with darker brown; small; 2 mm. in all dimensions.

Hilum color of seedcoat; lips of hilar groove usually pale straw; encompassed by light-brown halo; oblong; five times longer than wide; occupying 30 percent of seed circumference.

Lens brown to blackish; raised center about 0.5 mm. from hilum.

Legume straw to brown; glabrous; reticulate; 20–30×4–6 mm.; partially flattened to nearly terete; rhombic-oblong; obliquely acuminate at both ends; stipe 1 mm.; four to seven ovules; inner valve surface smooth; twisting tightly during dehiscence.

Notes.—Native of Texas and surrounding States. The delimitation of *V. ludoviciana* and *V. leavenworthii* is not clear. Each taxonomist who has worked with these species has presented an original interpretation. The seed characters of both species are based on typical specimens. Twelve samples studied.



BN-37019, BN-37020
FIGURE 23.—*Vicia ludoviciana* Nutt.: A, Legumes and seeds; B, seeds. R. Runyon 6015, Cameron Co., Tex. (NA, US).

Vicia lutea L.Yellow Vetch
(Fig. 24)

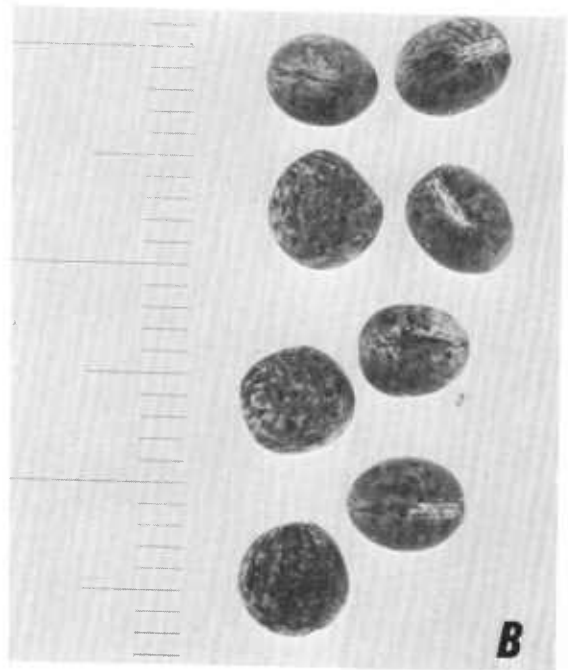
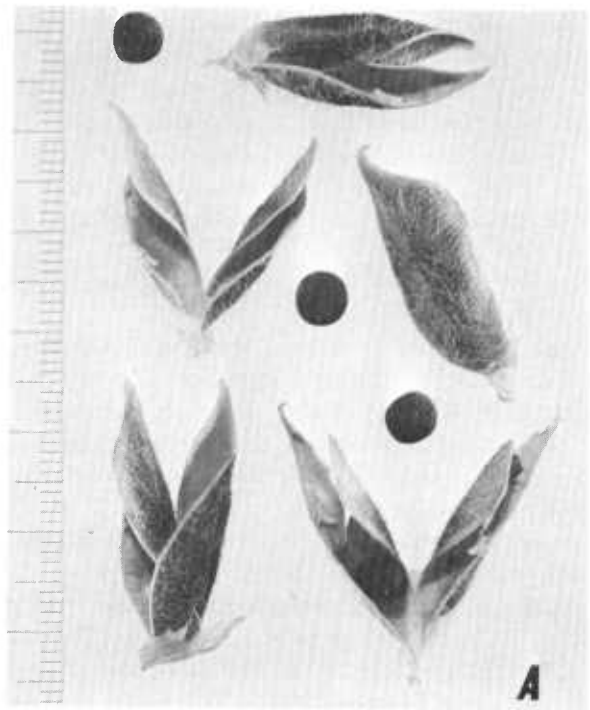
Seed compressed-spherical; smooth; dull, light ocher to light reddish brown, mottled and pointed with light brown, dark brown, and black; occasionally markings so dense as to appear monochrome blackish; medium to large; $5.5-6.5 \times 5.5-6.2 \times 4-4.6$ mm.

Hilum silvery because of funicular remnants, base black; lips of hilar groove essentially color of hilum; without halo; oblong; five to six times longer than broad, occupying 20-24 percent of seed circumference.

Lens blackish; on opposite side of seed from center of hilum.

Legume straw to brown to blackish brown to black; sericeous with hairs strongly pustulate at bases; faintly reticulate and heavily pustulate; $25-30 \times 7-10$ mm.; partially flattened; oblong-rhombic; obliquely acuminate at each end to almost beaked at apex; stipe 1.5-2 mm.; four to five ovules; inner valve surface smooth; twisting loosely during dehiscence.

Notes.—Introduced from Europe. Locally established in California. Eight samples studied.



BN-37076, BN-37075
FIGURE 24.—*Vicia lutea* L.: A, Legumes and seeds; B, seeds. C. R. Gunn 3181, greenhouse plant (NA).

Vicia minutiflora Dietr.Tiny-Flowered Vetch
(Fig. 25)

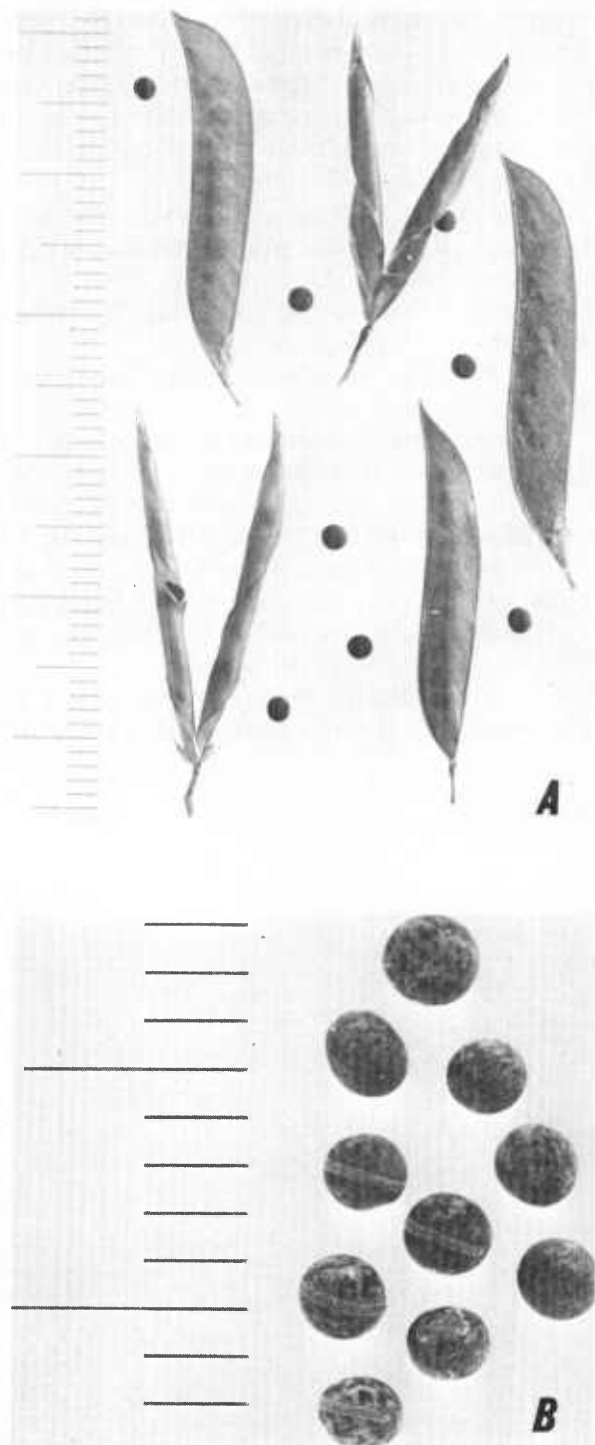
Seed subspherical to spherical; smooth; light, bright reddish ocher, mottled with black to obscurely mottled with color slightly darker than base color; small; $2 \times 2 \times 1.5$ mm.

Hilum color of seedcoat; lips of hilar groove light ocher; without halo; circumlinear; over 10 times longer than wide; occupying 75 percent of seed circumference.

Lens darker red than seedcoat; raised center about 0.4 mm. from hilum.

Legume straw to brown with greenish cast; glabrate to glabrous; punctate; $20-39 \times 4-5$ mm.; flat; linear-falcate; obliquely acuminate at both ends; stipe absent or nearly so; eight to 13 ovules; inner valve surface smooth; twisting tightly during dehiscence.

Notes.—Native of Tennessee to Oklahoma south to Florida and Texas. Found in woods, thickets, and along riverbanks. *Vicia reverchonii* S. Wats., a close relative of *V. minutiflora*, is an extinct species from the environs of Dallas, Tex., and Wewoka, Okla. The seeds of these two species are similar. The legumes of *V. reverchonii* are pubescent when mature. The status of *V. reverchonii* is under investigation. Seventeen samples studied.



BN-37041, BN-37042
FIGURE 25.—*Vicia minutiflora* Dietr.: A, Legumes and seeds; B, seeds. G. S. Goodman 5789, Marshall Co., Okla. (OKL).

Vicia monantha Retz.Bard Vetch
(Fig. 26)

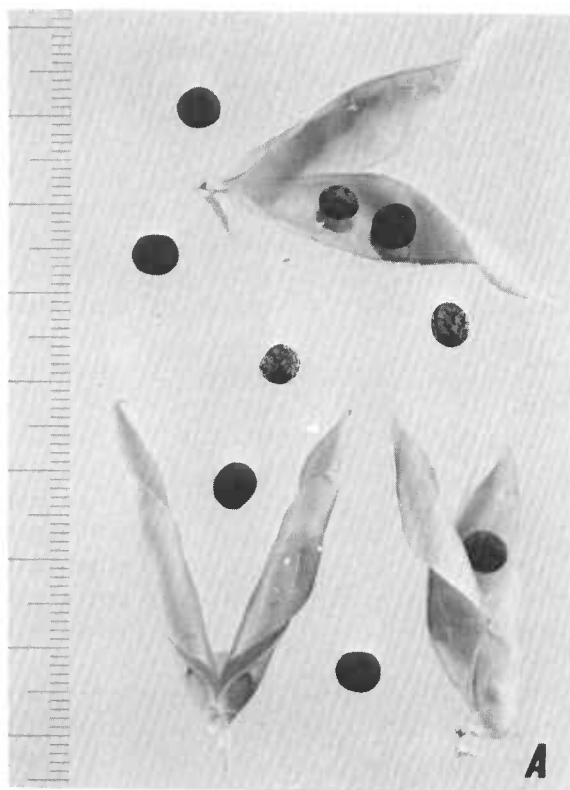
Seed subspherical to oval; smooth; light greenish ocher, mottled with light and dark brown, line of dark-brown mottles two-thirds way around seed; occasionally seeds so densely mottled as to appear dark brown or blackish; medium; $4 \times 4.3 \times 3.4$ mm.

Hilum color of seedcoat; lips of hilar groove light straw; without halo; slightly wedge shaped; three times longer than wide; occupying 9 percent of seed circumference.

Lens black; raised center about 1.5 mm. from hilum.

Legume straw colored; glabrous; reticulate and slightly depressed between seeds; $35-45 \times 12-20$ mm.; flattened; oblong; apex acuminate, base rounded; stipe 1.5 mm.; six ovules; inner valve surface with faint (occasionally lacking) fibrous ribs, always with prominent, discrete semilunate patches of fibers between each seed along sutures; twisting loosely or tightly during dehiscence.

Notes.—Introduced from southern Europe and eastern Asia. Cultivated in southwestern United States. Four samples studied.



BN-37038, BN-37037
FIGURE 26.—*Vicia monantha* Retz.: A, Legumes and seeds; B, seeds. C. R. Gunn 3546, greenhouse plant (NA).

Vicia narbonensis L.Narbonne Vetch
(Fig. 27)

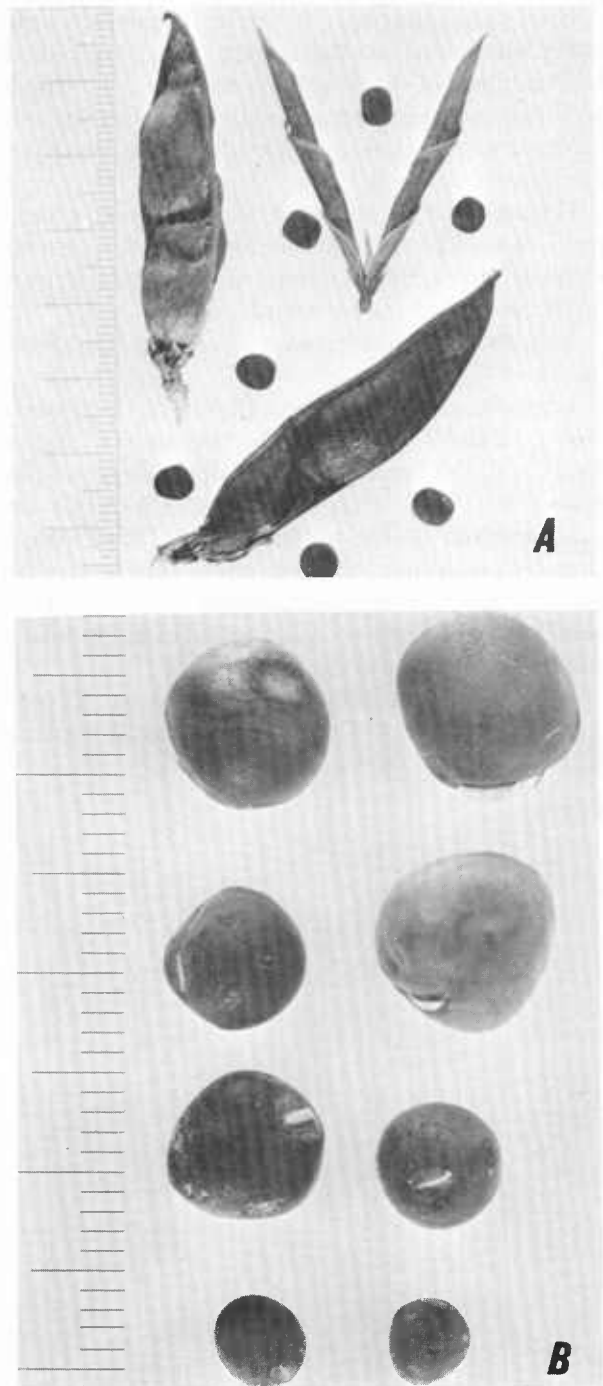
Seed subspherical to spherical; smooth; dull ocher, dull dark ocher, light-brown ocher, brown, to dark reddish brown, faintly or obscurely mottled and pointed; large to medium; $3-10 \times 3-10.5 \times 3-8$ mm.

Hilum darker than seedcoat, usually with white hilar groove; lips of hilar groove color of hilum; occasionally encompassed by blackish halo; elliptical; 1.5–2.5 times longer than wide; occupying about 12 percent of seed circumference.

Lens blackish; raised center from 1.3 to 3.5 mm. from hilum depending on seed size.

Legume straw to greenish to brownish black; glabrous; reticulate, knoblike processes widely scattered to absent, sutures pectinate; $40-70 \times 10-15$ mm.; plump; linear-oblong; obliquely acuminate at both ends; stipe absent; five to seven ovules; inner valve surface with prominent fibrous ribs; twisting loosely during dehiscence.

Notes.—Introduced from southern Europe. Cultivated and adventive. The seeds of *V. narbonensis* ordinarily are about 10, 8, or 5 mm. in diameter. The small seeds, about 3 mm. in diameter, came from the Institute of Agricultural Research, Plant Introduction Service, Beit Dagan, Israel. Plants from these small seeds produced seeds 5 mm. or more in diameter when grown in the Soil Conservation Service greenhouse. Twenty-six samples studied.



BN-37035, BN-37036
FIGURE 27.—*Vicia narbonensis* L.: A, Legumes and seeds; B, seeds. A, C. R. Gunn 3160 seeds, twisted legume 3484, and closed legumes 3489; greenhouse plants (NA). B, C. R. Gunn 3528, 3514; 3484, 3484; 3610, 3160; 3485, 3485; greenhouse plants (NA).

Vicia ocalensis Godfrey & KralOcala Vetch
(Fig. 28)

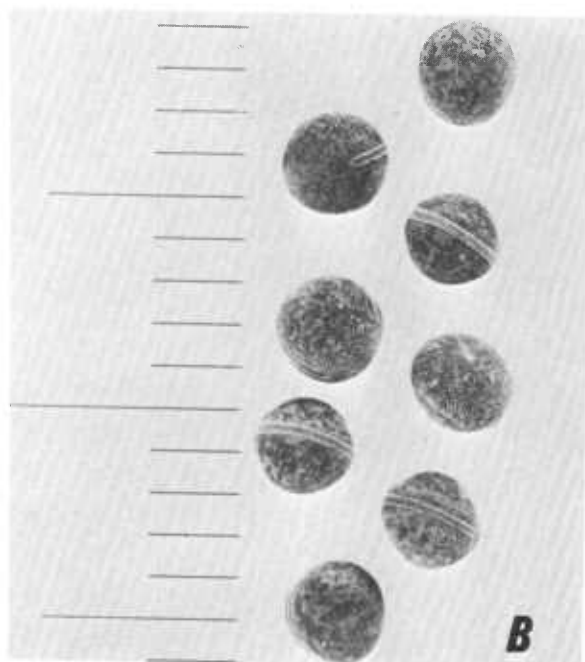
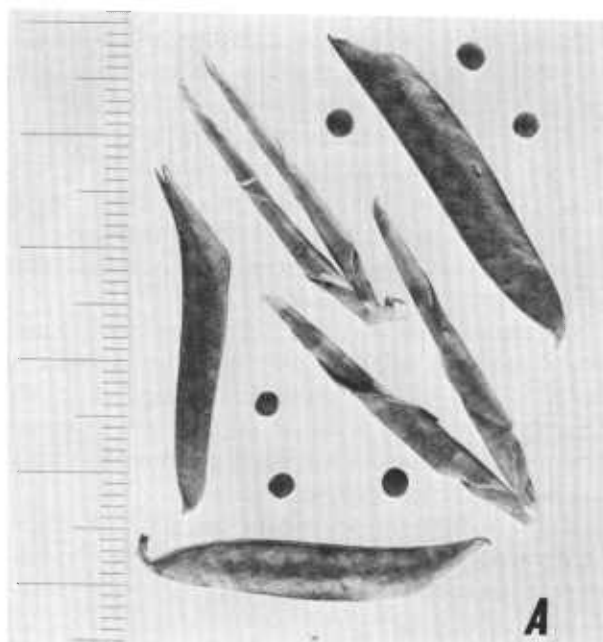
Seed subspherical; smooth; dull ocher to reddish brown both with greenish cast, mottled with darker brown; medium; $2.7 \times 2.6 \times 2.5$ mm.

Hilum color of seedcoat; lips of hilar groove color of hilum; without halo; circumlinear; over 10 times longer than wide; occupying 75 per cent of seed circumference.

Lens darker than seedcoat; nearly confluent with hilum; raised center about 0.4 mm. from hilum.

Legume straw with greenish cast to brownish black to blackish; glabrate to glabrous; large punctations; $35-45 \times 6-8$ mm.; partially flattened to terete; linear-oblong; obliquely acuminate at both ends; stipe 2 mm.; seven to 11 ovules; inner valve surface smooth; twisting tightly during dehiscence.

Notes.—Native of Lake Co. and Marion Co., Fla., in wet areas. Closely related to *V. acutifolia* and *V. floridana*. One sample studied.



BN-37011, BN-37012
FIGURE 28.—*Vicia ocalensis* Godfrey & Kral: A, Legumes and seeds; B, seeds. C. R. Gunn 3361, Lake Co., Fla. (NA, US).

Vicia pannonica CrantzHungarian Vetch
(Fig. 29)

Seed subpyramidal to compressed-spherical; smooth; rosy brown, mottled and pointed with brown and black; medium; $4.1 \times 4.2 \times 3.3$ mm.

Hilum silvery because of funicular remnants; lips of hilar groove brown; without halo; oblong; three to five times longer than wide; occupying 16 percent of seed circumference.

Lens darker than seedcoat; on opposite side of seed from center of hilum.

Legume straw colored; sericeous; with numerous nectary glands and weakly reticulate; $20-30 \times 7-10$ mm.; flattened; oblong; obliquely acuminate at both ends; stipe 2-3 mm.; four to five ovules; inner valve surface smooth; twisting loosely during dehiscence.

Notes.—Introduced from central Europe. Cultivated and naturalized in Pacific Northwest. Five samples studied.



BN-37033, BN-37034
FIGURE 29.—*Vicia pannonica* Crantz: A, Legumes and seeds; B, seeds. C. R. Gunn 3165 and 3495, greenhouse plants (NA).

Vicia pulchella HBK.Showy Vetch
(Fig. 30)

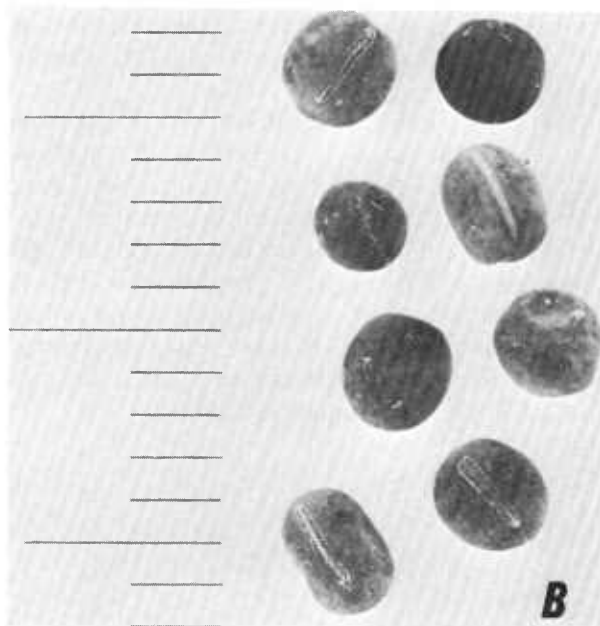
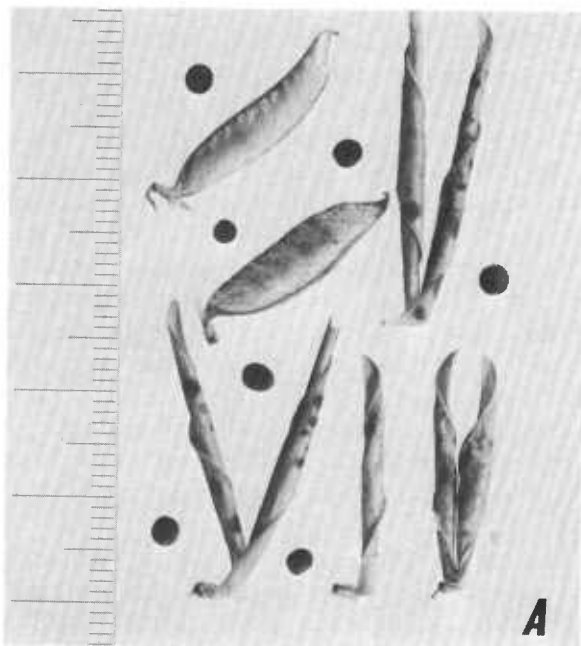
Seed subspherical; smooth; dark, dull reddish brown, mottled with black; small; $2.5 \times 2.4 \times 2.2$ mm.

Hilum color of seedcoat; lips of hilar groove slightly lighter than hilum; without halo; oblong or tending in some samples to be wedge shaped; six times longer than wide; occupying 26 percent of seed circumference.

Lens black; raised center about 0.7 mm. from hilum.

Legume straw colored; glabrous; reticulate; $20-35 \times 5-8$ mm.; flattened; oblong to slightly falcate; obliquely acuminate at both ends; stipe 1 mm.; five to seven ovules; inner valve surface smooth; twisting tightly during dehiscence.

Notes.—Native of Arizona, New Mexico, and Mexico. Grows in thickets, pine woods, open stony hillsides, and moist meadows, especially in the mountains (Transition Zone). Sixteen samples studied.



BN-37040, BN-37039
FIGURE 30.—*Vicia pulchella* HBK.: A, Legumes and seeds; B, seeds. Combination of C. G. Pringle 11970, Metepec, Mexico; G. B. F. Ownbey 2015, Chihuahua, Mexico; C. H. Muller 3451, Chihuahua, Mexico; and C. L. Lundell 5371, San Luis Potosi, Mexico (MICH).

Vicia sativa L.Common Vetch
(Fig. 31)

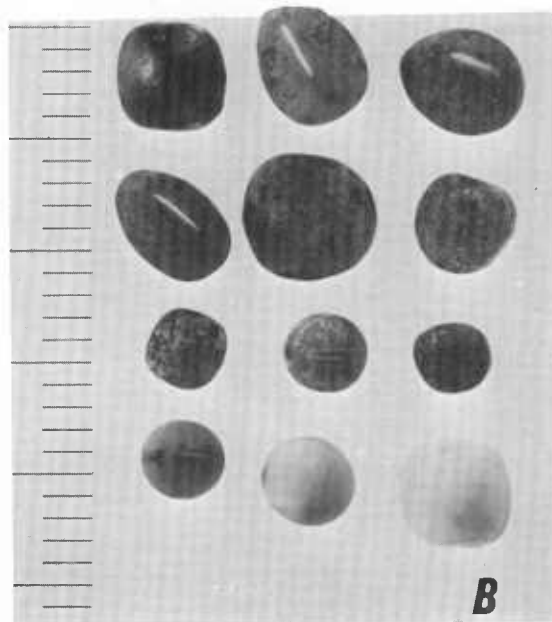
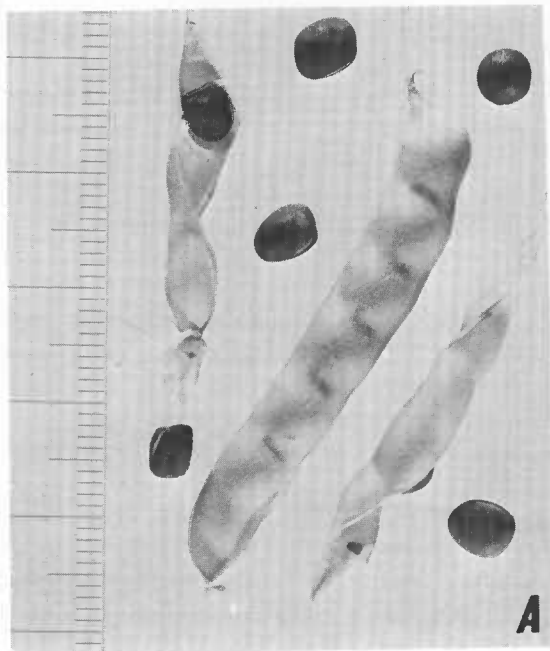
Seed rounded-rectangular (pillow shaped), subspherical to spherical, sublenticular, lenticular, ovoidal, or cuboidal; smooth; dull pale straw to dark greenish ocher to green, lightly to intensely mottled and pointed with light brown to dark brown; some seeds so densely mottled as to appear monochrome dark brown to blackish; medium to large; $4.5-6 \times 4.5-6 \times 2.7-5$ mm.

Hilum generally color of seedcoat; lips of hilar groove usually strongly whitened except in darker seeds; without halo; wedge shaped; three to four times longer than wide; occupying 14-15 percent of seed circumference.

Lens usually blackish, brown to light straw in seeds with lighter seedcoats; raised center usually 1 mm. from hilum, occasionally about 0.7 mm.

Legume light brown to straw; minutely pubescent, puberulent, or pubescent; reticulate and depressed between seeds; usually $40-80 \times 7-8$ mm., rarely 25×5 mm.; terete to somewhat compressed; apex oblique long acuminate (almost falcate), base rounded; stipe absent; 10 ovules; inner valve surface strongly fibrous ribbed; twisting loosely to tightly during dehiscence.

Notes.—Introduced from Eurasia. Cultivated and escaped along roadsides throughout United States. Frequent on west coast and rare in southern United States and in northern Mexico. Seeds of this species are rather variable and intergrade with seeds of *V. angustifolia*. Plants of *V. sativa* and *V. angustifolia* are similar. Seeds of cultivars of *V. sativa* are similar to seeds of *V. dasycarpa*; however, plants are not similar. Forty-seven samples studied.



BN-37031, BN-37032
FIGURE 31.—*Vicia sativa* L.: A, Legumes and seeds; B, color range of seeds. A, C. R. Gunn 3174, greenhouse plant (NA). B, C. R. Gunn 3571, 3552, 3574; 3460, 3693, 3549; 3553, 3551, 3551; 3524, 3506, 3153; greenhouse plants (NA).

Vicia sepium L.Hedge Vetch
(Fig. 32)

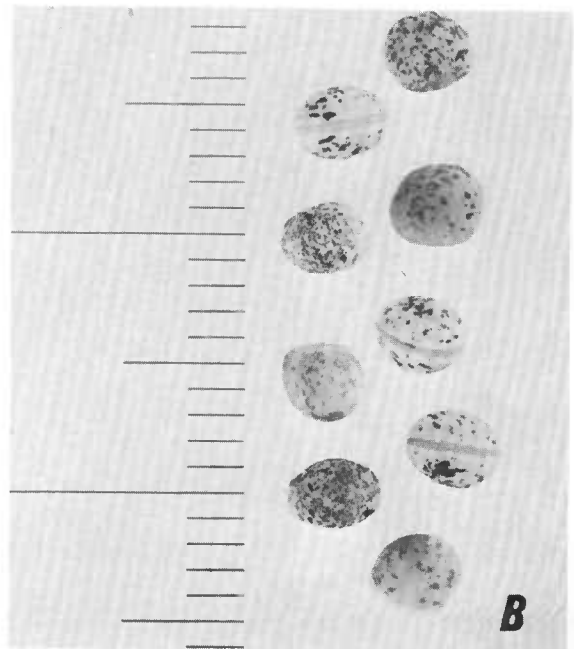
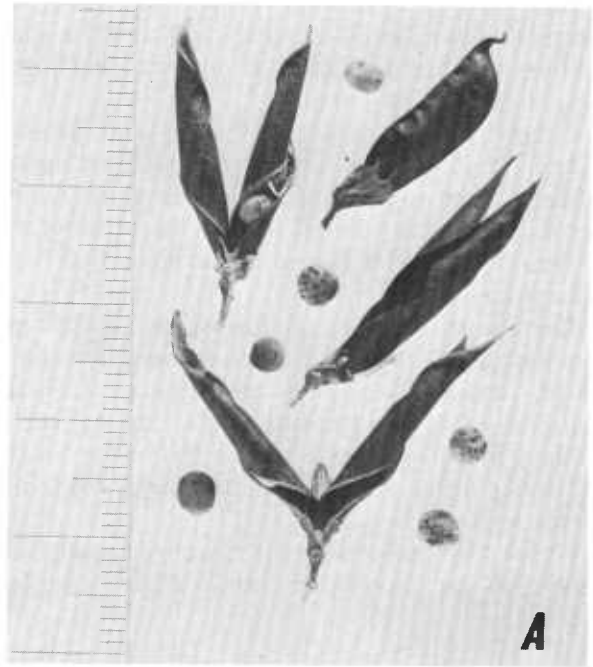
Seed oblong to subspherical; smooth; ocher to reddish ocher, lightly to densely mottled and pointed with chocolate color; medium; $3.5 \times 3.3 \times 3$ mm.

Hilum color of seedcoat; lips of hilar groove lighter than or color of hilum; encompassed by lighter halo; circumlinear; over 10 times longer than wide; occupying 75 percent of seed circumference.

Lens confluent with hilum and only slightly discolored, almost invisible on lightly mottled seeds.

Legume black; glabrescent; punctate; $18-35 \times 6-8$ mm.; nearly terete; oblong; obliquely acuminate at both ends, almost beaked at apex; stipe 1.5 mm.; five to six ovules; inner valve surface smooth; twisting tightly during dehiscence.

Notes.—Introduced from Europe. Naturalized in old fields and along roadsides, Newfoundland to Ontario, south to New Brunswick and northern New England. Nine samples studied.



BN-37014, BN-37013
FIGURE 32.—*Vicia sepium* L.: A, Legumes and seeds;
B, seeds. C. R. Gunn 3659, field grown (NA).

***Vicia tenuifolia* Roth**Bramble Vetch
(Fig. 33)

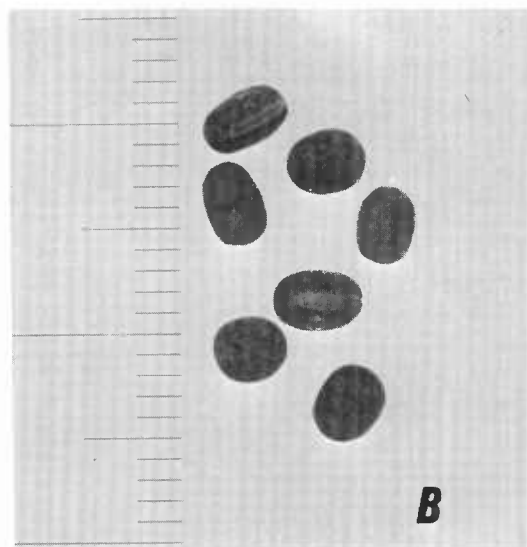
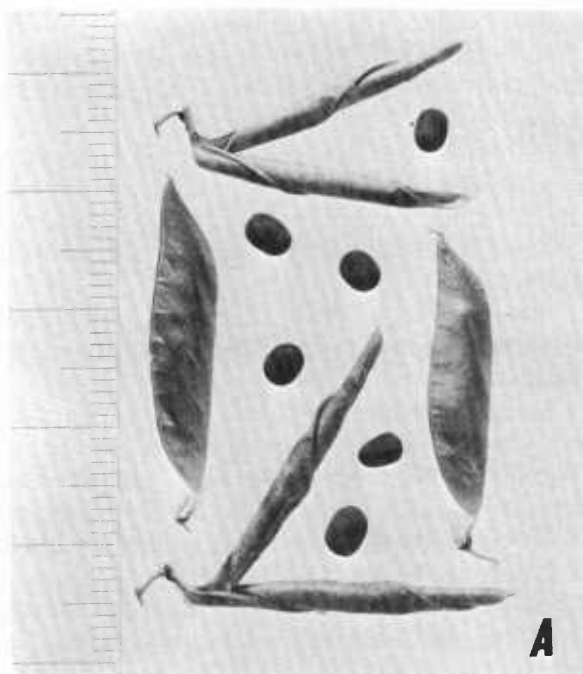
Seed oblong to subspherical; smooth; dark greenish ocher, marked with small mottles and points of slightly darker brown; medium; $3.3-4 \times 2.5-3 \times 2.3-2.6$ mm.

Hilum color of seedcoat; lips of hilar groove lighter than or color of hilum; without halo; oblong; four to five times longer than wide; occupying 21-24 percent of seed circumference.

Lens blackish; flattened center from 0.7 to 1 mm. from hilum.

Legume glabrate to glabrous; reticulate and punctate; $2.5-3.5 \times 5-6$ mm.; partially flattened; oblong; obliquely acuminate at both ends; stipe 2 mm.; seven ovules; inner valve surface smooth or with traces of fibrous cross-ribs near lower suture; twisting tightly during dehiscence.

Notes.—Introduced from Europe. Locally established on cultivated land. Nine samples studied.



BN-37030, BN-37029
FIGURE 33.—*Vicia tenuifolia* Roth: A, Legumes and seeds; B, seeds. C. R. Gunn 3662, greenhouse plant (NA).

Vicia tetrasperma (L.) MoenchSparrow Vetch
(Fig. 34)

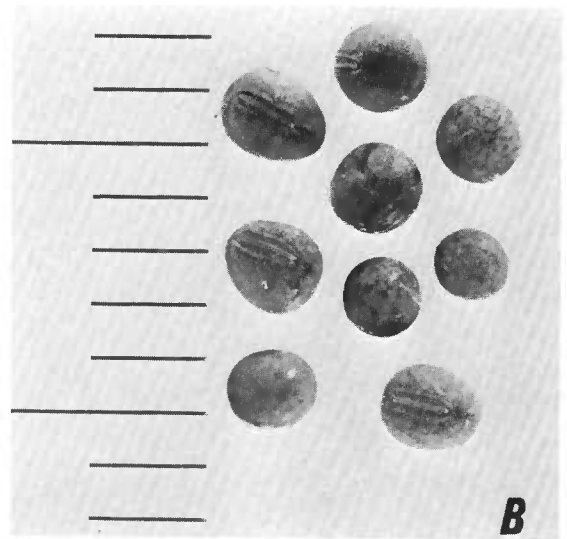
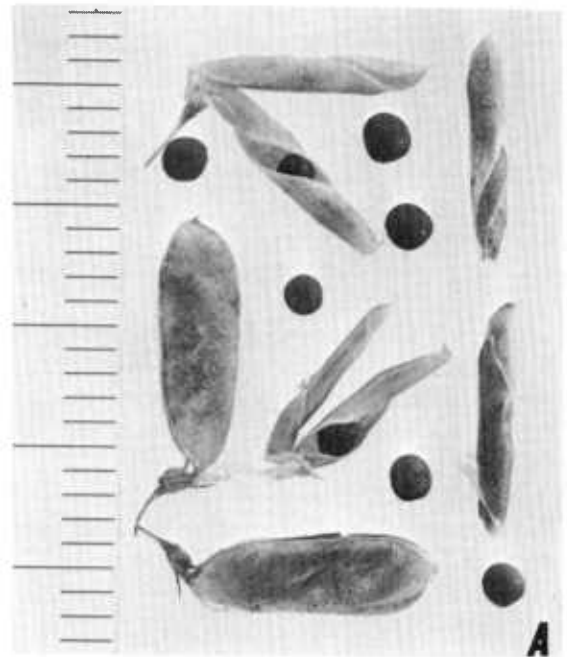
Seed spherical; smooth; light to dark greenish ocher, lightly to densely mottled and pointed with darker brown; small; $1.7 \times 1.6 \times 1.6$ mm.

Hilum brown or ocher; lips of hilar groove ocher; occasionally encompassed by ocher halo; slightly wedge shaped; three times longer than wide; occupying 13–21 percent of seed circumference.

Lens darker than seedcoat; about 0.4 mm. from hilum.

Legume straw to dark brown; glabrous; faintly reticulate; $10\text{--}15 \times 3\text{--}5$ mm.; flat; oblong; rounded at both ends; stipe 0.5–1 mm.; usually four, but occasionally three to six, ovules; inner valve surface smooth; twisting tightly during dehiscence.

Notes.—Introduced from Eurasia. Naturalized along roadsides and in fields and waste places from Newfoundland to British Columbia, south to Florida and California. Fifteen samples studied.



BN-37027, BN-37028
FIGURE 34.—*Vicia tetrasperma* (L.) Moench: A, Legumes and seeds; B, seeds. C. R. Gunn 3307, Jasper Co., Ga. (NA, US).

***Vicia unijuga* A. Br.**Two-Leaflet Vetch
(Fig. 35)

Seed oblong to subspherical; smooth; dull, dark ocher, densely mottled and pointed with blackish brown; medium; $3.4 \times 2.7 \times 2.5$ mm.

Hilum color of seedcoat or silvery because of funicular remnants; lips of hilar groove color of hilum; without halo; oblong; five to seven times longer than wide; occupying 27 percent of seed circumference.

Lens darker than seedcoat; raised center 1.7 mm. from hilum.

Legume pale brown; glabrous; faintly reticulate; $18-28 \times 5$ mm.; elliptic-lanceolate; obliquely acuminate at both ends; stipe 2 mm.; five to six ovules; inner valve surface smooth; twisting tightly during dehiscence.

Notes.—Introduced from eastern Asia. Rarely found in United States. Four samples studied.

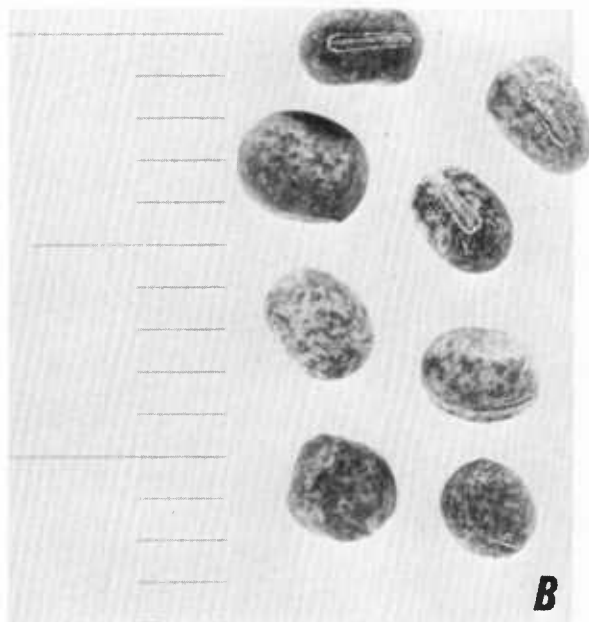
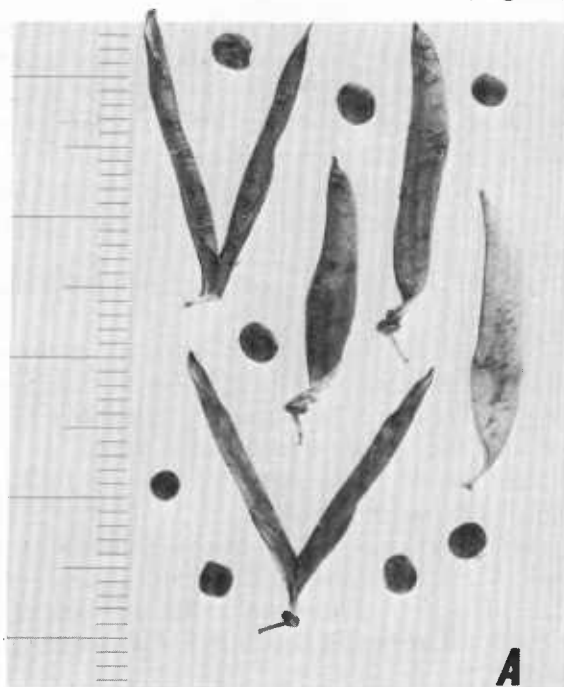


FIGURE 35.—*Vicia unijuga* A. Br.: ^{BN-37026, BN-37025} A, Legumes and seeds; B, seeds. C. R. Gunn 3678, field plant (NA).

Vicia villosa RothHairy Vetch
(Fig. 36)

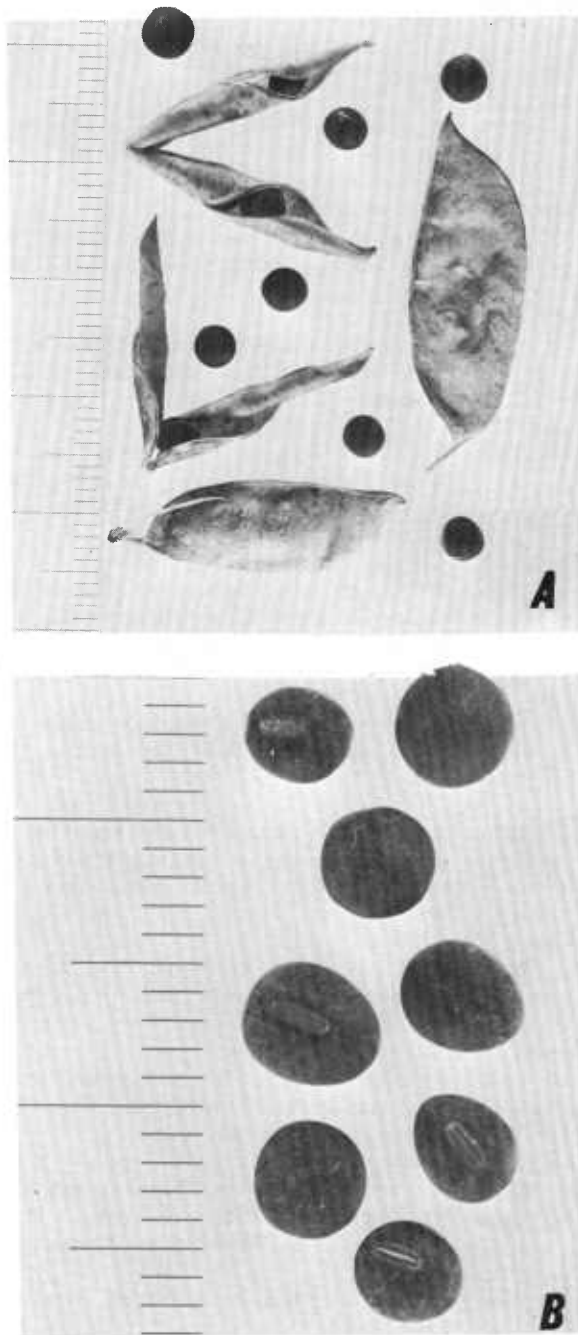
Seed spherical to nearly sublenticular; smooth; dull dark reddish brown to dull greenish brown, densely mottled and pointed with blackish brown; medium; $3.5-4.9 \times 3.4-4.9 \times 3.2-3.8$ mm.

Hilum color of seedcoat or darker; lips of hilar groove essentially color of hilum; without halo; oblong; three times longer than wide; occupying 14 percent of seed circumference.

Lens darker than seedcoat; from 1 to 1.3 mm. from hilum.

Legume dark to light straw color; glabrous; reticulate and punctate; $20-35 \times 7-10$ mm.; flattened; oblong; obliquely short acuminate at both ends (occasionally almost rounded); stipe 2-3 mm.; four to five ovules; inner valve surface smooth; twisting tightly to loosely during dehiscence.

Notes.—Introduced from Europe. Cultivated and naturalized along roadsides and waste places throughout United States and Canada. In southern United States var. *glabrescens*, smooth hairy vetch, is rather common. In northern United States and Canada var. *villosa*, hairy, hairy vetch, is rather common. *V. villosa* var. *glabrescens* has seeds identical to those of *V. villosa* var. *villosa*. The former variety is not synonymous with *V. dasycarpa*. Seeds of *V. villosa* are similar to those of *V. dasycarpa*. Hillman (1933) illustrated the differences between seeds of *V. villosa* and *V. dasycarpa*. Some taxonomists have combined these two species based on plant characteristics. Forty samples studied.



BN-37016, BN-37015
FIGURE 36.—*Vicia villosa* Roth: A, Legumes and seeds; B, seeds. C. R. Gunn 2833, Story Co., Iowa (ISC).

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